THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXII. CLEVELAND, O., FEBRUARY 28, 1889. NUMBER 9.

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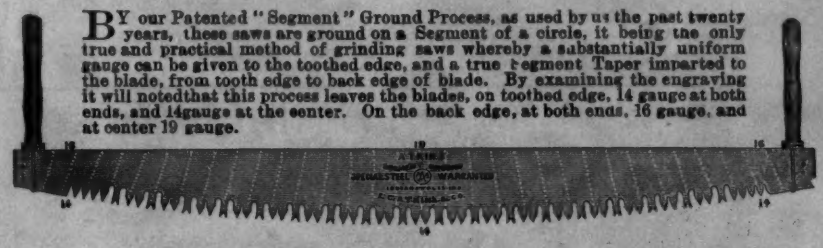

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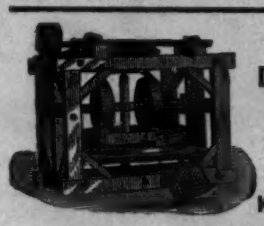

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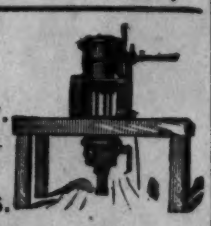

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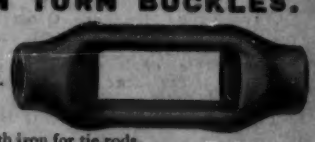

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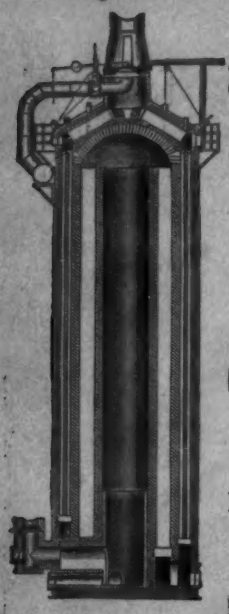

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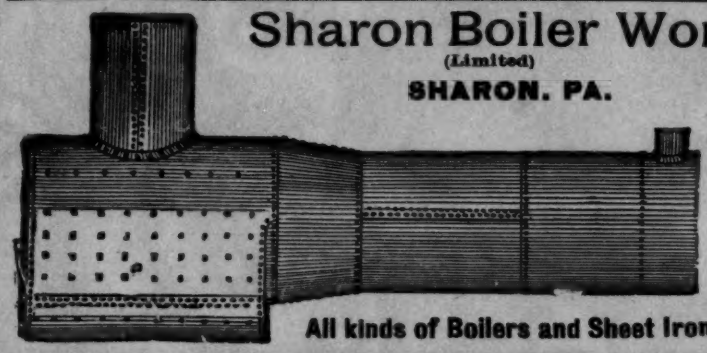

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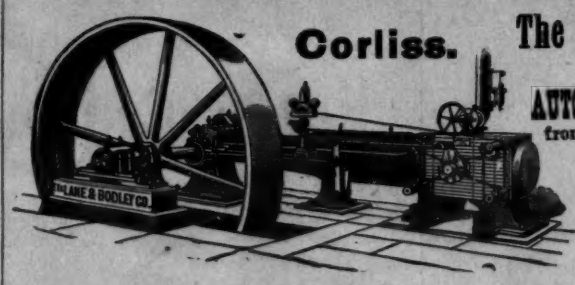

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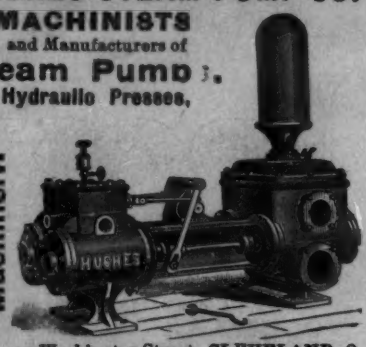

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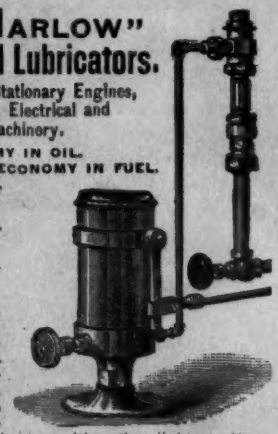

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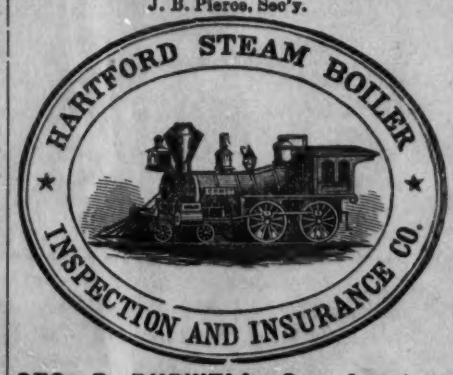

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THE
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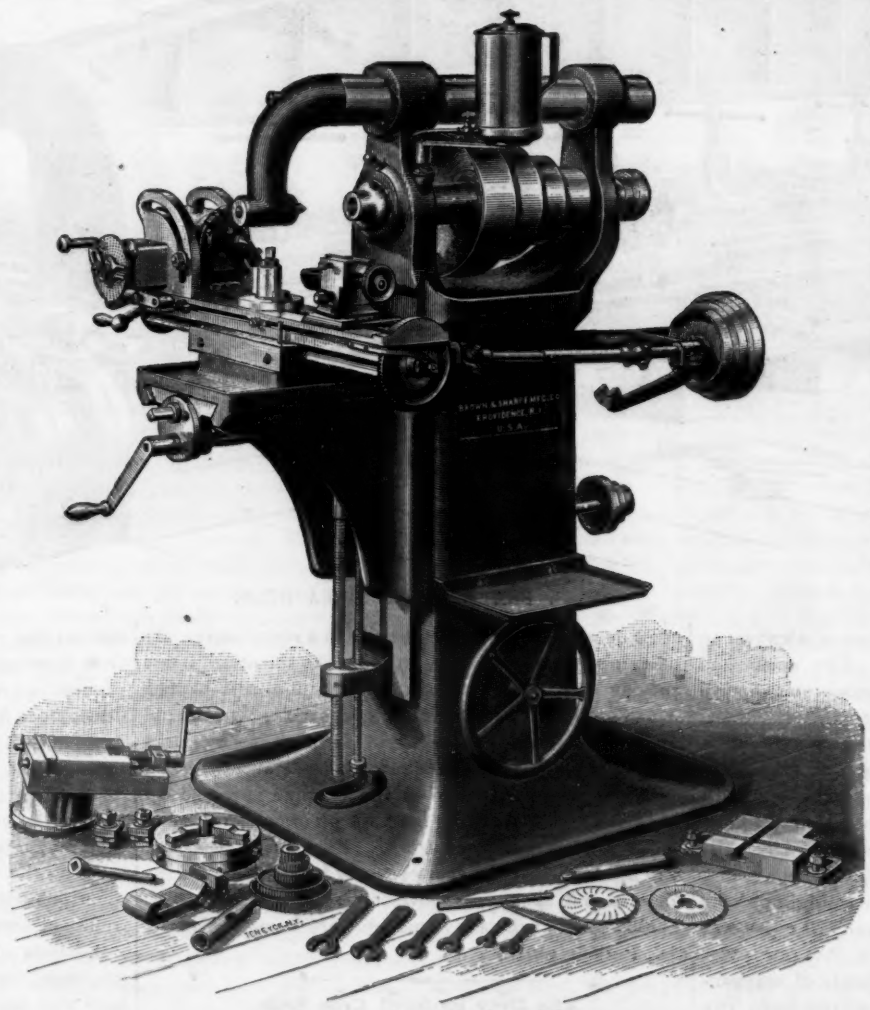
VOLUME XXII. CLEVELAND, O., FEBRUARY 28, 1889. NUMBER 9.

UNIVERSAL MILLING MACHINE.

Universal milling machines were first made by J. R. Brown & Sharpe, now the Brown & Sharpe Manufacturing Co., of Providence, R. I. From time to time the original machines have been modified in details, and the No. 1 Universal machines as now made, with an overhanging arm are shown by engraving on this page. The original machines were first prominently brought to the attention of mechanics at the Paris Exposition in 1867. Their superiority for certain classes of work was at once recognized, and they have been frequently imitated by machine tool builders both in America and in Europe. By some European manufacturers they have been copied in every detail.

The wear of the main spindle is taken up by longitudinal movements, and the end thrust is taken by a collar. The front box is hardened and ground. The cone has four steps for a 3-inch belt. The knee can be moved vertically 15 inches, and the saddle holding the spiral bed can be moved 6 inches in a direction parallel with the axis of the main spindle. The table is 28 inches long and 5 inches wide, and has an automatic feed of 17 inches. A series of graduations shows in degrees the angle to the axis of the spindle at which the table is fed, and index dials show the vertical and horizontal movements of the knee in thousandths of an inch. The spiral head has indexing mechanism by which the periphery of a piece of work may be divided into equal parts, and the velocity of the rotary movement of its spindle or of the work relative to the speed of the feed screw, is regulated by change gears at the end of the bed. Any spiral of the 68 provided for may be cut without interfering with the divisions obtainable from the index plate.

The spindle may be moved through any required portion of a revolution or rotated continually and, by the use of the raising blocks, the spiral head may set at any angle on the bed. A taper hole, 1 1-16 inches diameter, at the small end, extends through the spindle and is fitted to receive the collets and arbors that are used in the main spindle. The front end of the spindle is threaded to receive a chuck. A piece, 8 inches diameter and 4 inches in length can be swung between the spiral head and the foot stock. The frame is hollow, and fitted as a closet to hold the small parts that accompany the machine. Each machine is furnished with a "Treatise on the Construction and Use of Universal Milling Machines," tables of pitchers and angles of spirals, a set of change gears and index plates, a vise, a 6-inch three-jawed chuck, stops, raising block, hand-wheel, collet, wrenches and complete overhead works. The vise has jaws 5⅛ inches wide, 1⅛ inches deep, and will open 2¾ inches. The base is round, and can be clamped upon the bed at any angle. The overhead works have two friction pulleys, 14 inches diameter, for 3½-inch belt, and hangers with self-oiling and adjustable boxes. The countershaft is usually run at about 110 turns per minute. The total weight is about 1,700 lbs. The floor space, measured over the extreme projections and points of travel of the various parts, is 55x50 inches. One special advantage of a large shop is that it makes it easy to have a thorough system of inspection by men entirely independent of the workmen or foremen who are responsible for the machines. The Brown & Sharpe inspectors are largely governed in their work by carefully established rules. More than forty such rules relate to the Universal Milling Machines, and some of them give the limits of variation that can be allowed from absolutely correct positions or exact sizes. For example:—The knee slide in its whole length is allowed to be not more than two one-thousandths of an inch out of parallel with the spindle. This makes less than one one-thousandths of an inch variation in the whole length of the feed. The workmanship and the universal character of these machines render them especially valuable on tool or similar work, and generally they are found in the establishments of leading machine tool builders, technical schools, government arsenals, gun and sewing machine works, and fine jewelry factories.



UNIVERSAL MILLING MACHINE.

Material in a Steamer.

The amount of material necessary in the construction of a 1,200-ton steamer is simply astonishing. It takes 40,000 lineal feet of timber, 25 tons for hog chains, and in all 50 tons of iron, 120 bales of oakum to calk the seams, and fully $5,000 worth of paint. The cost of such a boat at the yards runs about $80,000, to which an additional $25,000 may be added for furnishing. It takes generally about five months to put up a 1,600-ton boat, and it should last ten years with ordinary care. When the hull of a boat is finished, every nook and corner is filled with salt, about 100 barrels being used for a 1,200-ton boat. This is done to prevent the rotting of the timber, and, strangely enough, the cabins and upper works usually decay much sooner than the hull.—[Globe-Democrat.

THE Bank of England building, London, covers eight acres, and employs 1,000 persons.

LIGHT WITHOUT HEAT.

A great many experimenters are now trying to find out some way of producing light without producing heat at the same time. If this can be done at all, it will probably lessen the cost of lighting our streets and buildings very considerably. Some years ago, James Clerk Maxwell advanced the theory that light is a sort of electrical disturbance of the ether that is supposed to fill space. This theory, though not yet rigorously proven, is supported by a great deal of evidence—in fact, by all the evidence we have. We know, for instance, that light and electric induction are propagated by the same medium, and with the same velocity. We know, further, that each consists of wave-like motions or strains, in that medium; and that the waves of both are transverse and unlike those of sound. There are other reasons, too, for believing that Maxwell's theory is correct, and that the difference between light and electric induction is the period of their respective waves. If this is a fact, it is evident that if we could charge and discharge a Leyden jar rapidly enough it would break out and shine with a brilliancy that would depend only on the intensity of the electricity supplied to it. Now it is believed to be possible to charge and discharge such a jar a thousand million times a second, which would be the same as sending a thousand million waves a second out into space; yet this rapidity, though it is utterly inconceivable to the human mind, is stillness itself compared with what is required to produce light, and it must be increased at least four hundred thousand fold before it can produce the faintest glimmer.

Grim as the outlook is, we can take courage from the fire-flies, for they seem to have overcome the difficulties somehow. Maxwell's theory, if correct, is a stupendous generalization; and though it has been of no use to us yet, some way of applying it in the arts must soon be discovered. The possibility that it suggests, of transmitting light by electricity as we now transmit sound, is curious and interesting; and it would be a novel experience to stroll the streets of Hartford on a Summer evening, bathed in light shining somewhere in China.

Shipbuilding.

Shipbuilding in this country exhibits much activity, and so great is the demand upon the resources of various shipbuilding yards, that it is understood that the United States & Brazil Mail Steamship Co. is unable to procure bids upon two steamers which it wants, unless willing to wait two years for them to be finished. The ships negotiated for include one for the Mallory Steamship Co. and two for the New York & Cuba Mail Steamship Co., which will be built at Roach's yard, one for the Morgan line and two for the Red "D" line, contracted for at William Cramp & Son's, and a steel steamer, of 5,000 tons displacement, which a Scotch firm is building for the Pacific Mail Steamship Co. The steamers contracted for in this country range from 305 to 350 feet in length, and their equipment will include triple-expansion engines and all of the modern improvements.

THE Ohio Legislature has passed a bill fixing telephone rental at $3 per month, and $2.50 each for two.

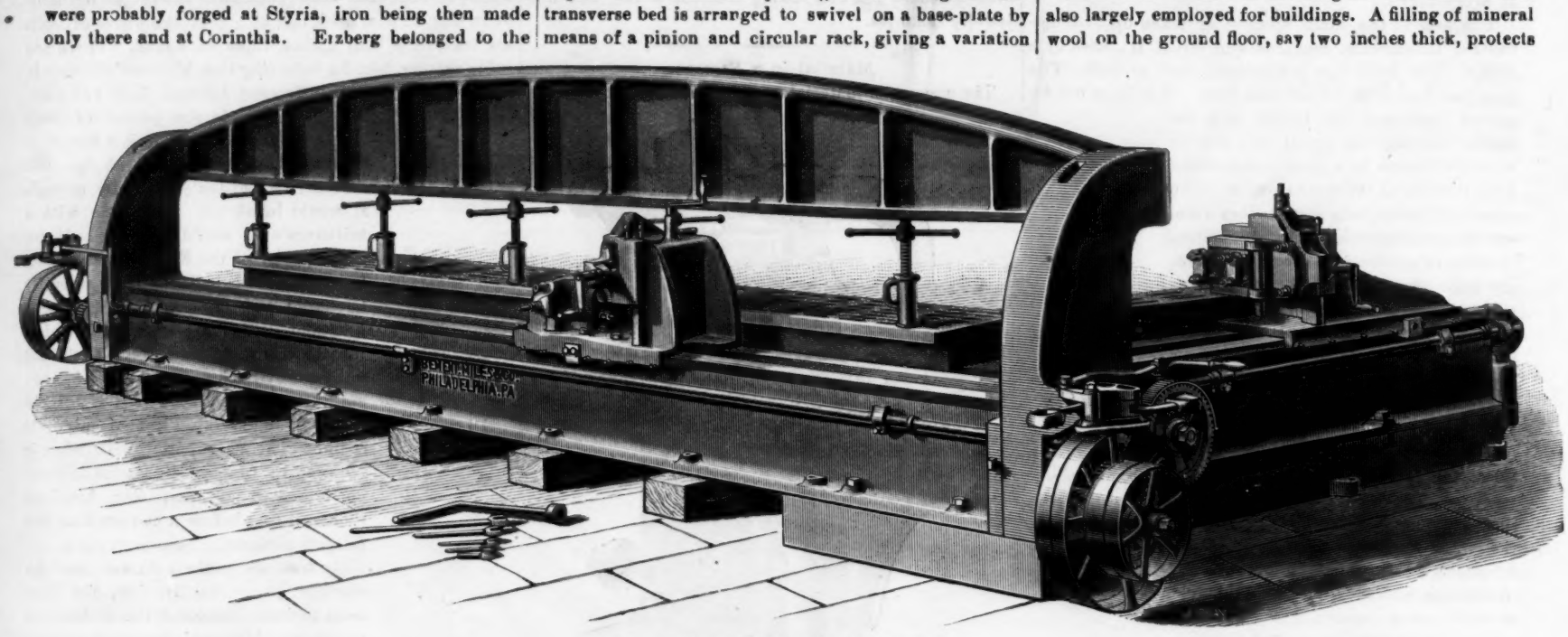
THE MANUFACTURE OF TOOL STEEL.

Ironmongery (London).

At the meeting of the South Staffordshire Institute of Iron and Steel Works Managers, recently, Mr. Thomas Turner, lecturer on Metallurgy, at Mason's College, Birmingham, read a paper on "The Manufacture of Styrian Open-Hearth Steel, with Notes on the Treatment of Tool Steel," in the compilation of which he had been assisted by Mr. F. Korb, of Sheffield. The interest of the paper was much enhanced by the exhibition of a Styrian open-hearth furnace and several of the tools used in that district in the Frischen process of making high-class tool steel. Samples of ores and products were also on the table. Reference was made by the lecturer to the justly-renowned Erzberg or Ore Mountain, situated between Vordenberg and Eisenerz. This mountain consists, it was stated, of a bedded mass of spathic iron ore, which rests below upon old schists, believed to be of Devonian age. The mountain itself is conical, with a rounded summit, and reaches a height of about 4,800 feet above the sea level, and nearly 3,000 feet above the small town of Eisenerz. It is surrounded by lofty mountains, most of which exceed 6,000 feet in height, and present a very imposing and picturesque appearance. Iron ore had been quarried from this mountain from the very earliest antiquity, for it was believed that the "Noric Iron" of Tacitus, Ovid and Horace, was made from ore quarried on the face of the Erzberg or its immediate neighborhood. The nails used in the crucifixion of Jesus Christ were probably forged at Styria, iron being then made only there and at Corinthia. Erzberg belonged to the Roman province of Noricum, and the ore was known to have been quarried by the Romans. The works had been in operation ever since, and the mountain appears to be still full of inexhaustible treasure. Unfortunately, a fire which occurred in Eisenerz in the year 1618, destroyed valuable documents, carrying back the history of the manufacture to A. D. 712. The records now in existence only went back to the twelfth century, which, early as it was, must still be regarded as late in the history of Erzberg. The lowest ores were somewhat more silicious, and so less valuable, while those higher on the mountain were of special purity. Usually, the ore was basic in character, and contained, in the raw state, upwards of 40 per cent. of iron, 2 per cent. of manganese, about 3 per cent. of magnesia, and a little lime. The quantity of sulphur and phosphorous was small, and from this highly suitable ore it was that the noted Styrian tool steel was smelted. Works for the production of open-hearth raw steel were distributed along the sides of the rivers in the Styrian Alps, each small works being at a slope or fall of the river capable of developing about 50 horse-power. The fuel used was also specially adapted to the production of an article of special quality, being soft pine charcoal, fifty bushels of which were required to make 2cwt. of raw steel. Nature had, in some respects, been very generous to the Styrian steel makers, and it was entirely due this fact that old and costly processes, such as had been described, were still in existence, side by side with modern methods. And in those cases where the quality of material was a more important factor than that of cost, the older processes, conducted with so much labor, expense and care, had as yet nothing to fear from their modern rivals, but at present maintain, and would in all probability retain, their place in the markets of the world. The remainder of the paper dealt with the hardening of tool steel, Mr. Turner observing in conclusion that he trusted that those who were in the habit of using such material might not rest content with mere rule of thumb, however successful (or otherwise) they might have been in the past, but that they would endeavor to find the scientific reason for the various phenomena which they from time to time observed, and thus arrive at greater perfection in the difficult art of hardening and tempering tool steel.

NO. 4 PLATE PLANING MACHINE.

The engraving represents a machine designed to plane two edges of a plate up to 30 feet in length, by 10 feet in width at one setting, or any length by shifting. The advantage of such an arrangement is manifest, for it not only admits of finishing the entire plate at two settings, but it saves room, for with the usual type of machine, which cuts one edge at a time, the plate has to be set transversely as well as parallel to the bed, requiring a space in both directions equal to its greatest length. The planer has sufficient power to work 1-inch steel plates with ease, and is therefore serviceable for heavy marine boilers and ship plating. The carriage on the longer bed has two tool slides facing each other and cutting in reverse directions, one of them having a vertical slide with a swivel for cutting a strip off the edge of a sheet and for planing internal angles. The transverse bed is arranged to swivel on a base-plate by means of a pinion and circular rack, giving a variation of 10 degrees in either direction from a right angle. As its carriage has much less to do than the other, it has but one tool slide, cutting in one direction, with a quick return motion. The clamping bar is bolted to the uprights and the plates are held in position by hand screw-jacks which can be quickly placed and removed. Owing to the space between the clamping bar and the table, the machine can be used for planing beams, keels and a variety of other work. Each carriage has an independent driving gear operated by two belts for the forward and backward movements, separately shifted. The builders of the above machine are Bement, Miles & Co., Philadelphia, Pa.



NO. 4. PLATE PLANING MACHINE.

The Duty on Steel Crop Ends.

Assistant Secretary Maynard has informed a firm of New York importers that the question recently decided in the Supreme Court in the case of Robertson against Perkins was simply to the effect that as steel was a metal specified in the tariff acts, steel rail crop ends cannot be classified under the provision for "metal unwrought not specially enumerated or provided for." The question as to whether such ends or pieces of steel rails are dutiable as "steel not specially enumerated or provided for," or as "scrap steel," was not, he says, presented in that case, but was covered by a previous decision of the court in the Schlesinger case. This decision, he says, is the basis of Department's ruling of February 14th, 1887, that such merchandise having been in actual use in making the rails is dutiable under the provisions for "scrap steel." The Department, therefore, declines to apply the decision in the Perkins case to certain steel rail crop ends heretofore imported.

MINERAL WOOL.

Mineral wool is the name of an artificial product now used for a great variety of purposes, chiefly, however, as a non-conductor for covering steam surfaces of whatever character. It is largely used for this, and the underground steam pipes of the New York Steam Company are insulated with it.

Mineral wool is made by converting vitreous substances into a fibrous state. The slag of blast furnaces affords a large supply of material suitable for this purpose. The product thus obtained is known as slag wool. For the reason that slag is seldom free from compounds of sulphur, which are objectionable to the fibre, a cinder is prepared from which is made rock wool. The products comprise the two kinds of mineral wool; they are not to be distinguished from it, but from each other.

The resemblance of the fibres to those of wool and cotton has given the names of mineral wool and silicate cotton to the material, but the similarity in looks is as far as the comparison can be followed. The hollow and jointed structure of the organic fibre, which gives it flexibility and capillary properties, is wanting in the mineral fibre. The latter is simply finely-spun glass of irregular thickness, without elasticity or any such appendages as spicules, which would be necessary for weaving purpose. The rough surfaces and markings of the fibre can only be detected under a strong magnifying glass.

Aside from its uses as covering for hot surfaces it is also largely employed for buildings. A filling of mineral wool on the ground floor, say two inches thick, protects against the dampness of cellar; in the outside walls, from foundation to peak, between the studding, it will prevent the radiation of the warmth of interior and will destroy the force of winds, which penetrate and cause draughts; in the roof it will retain the heat which rises through the stair-wells, bringing about regularity of temperature in cold weather; the upper rooms will not receive the heat of the summer sun and store it up for the occupants during the night, but remain as cool as those on the floor below; the water fixtures in bath-rooms, closets, and pantries will not be exposed to extremes of heat and cold.

Analysis of mineral wool shows it to be silicate of magnesia, lime, alumina, potash and soda. The slag wool also contains some sulphur compounds. There is nothing organic in the material to decay or to furnish food and comfort to insects and vermin; on the other hand, the fine fibres of glass are irritating to anything which attempts to burrow in them. New houses lined with mineral wool will not become infested with animal life, and old walls may be ridden of their tenants by the introduction of it.

Mineral wool is largely used for car linings, in which service it reduces the noise of travel greatly. Aside from those mentioned, it can be applied generally in the arts for all purposes where a non-conductor or a shield is required, and the experience of several years shows that it is both serviceable and cheap.—[The Engineer.

CIRCULAR appertures are most effective for discharging water, since they have less frictional surface for the same area.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, FEB. 1, 1889.

Compiled for the "American Manufacturer and Iron World."

LOCATION OF FURNACES.	CHARCOAL.					ANTHRACITE.					BITUMINOUS OR COKE.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		No.	Weekly capacity.	No.	Weekly capacity.		No.	Weekly capacity.	No.	Weekly capacity.		No.	Weekly capacity.	No.	Weekly capacity.
New England	14	8	760	6	517										
New York	10	3	317	7	847	27	11	3,370	16	4,790	3	1	1,000	2	2,000
New Jersey						15	5	1,676	10	3,562					
Spiegel						3	3	275	0	0					
Pennsylvania	21	5	250	16	995										
Lehigh Valley						47	25	7,960	22	5,865					
Spiegel						1	1	125	0	0					
Schuylkill Valley						44	25	7,417	19	4,665					
Upper Susquehanna Valley						19	10	2,574	9	1,815	1	0	0	1	200
Lower Susquehanna						36	23	7,225	13	2,065					
Pittsburgh											19	16	17,050	3	1,750
Spiegel											1	1	450	0	0
Allegheny Valley											2	1	597	1	125
Shenango Valley											22	15	9,026	7	3,770
Youghiogheny Valley											5	4	1,400	1	525
Juniata and Conemaugh Valley											22	12	5,780	10	3,445
Spiegel											1	0	0	1	250
Maryland	11	4	450	7	495	4	1	150	3	600	1	0	0	1	140
Virginia	22	2	110	20	1,040						12	9	4,512	3	1,850
North Carolina	2	1	153	1	240										
West Virginia	3	0	0	3	190						6	4	2 535	2	580
Ohio—Mahoning Valley											14	11	8,007	3	1,900
Eastern, Central and Northern											18	12	8,282	6	4,442
Hocking Valley											15	8	2,250	7	1.642
Hanging Rock	15	8	795	7	740						13	9	1,980	4	1,250
Miscellaneous	1	0	0	1	200										
Kentucky											4	3	1,200	1	400
Hanging Rock	2	2	240	0	0										
Western Region and Miscellaneous	2	0	0	2	154										
Tennessee	8	4	891	4	677						10	10	5.521	0	0
Georgia	2	1	65	1	98						2	1	700	1	308
Alabama	10	8	2,045	2	350						20	15	9,700	5	1,470
Indiana											2	2	450	0	0
Illinois											16	8	9,525	8	5,650
Michigan	26	11	3,448	15	4,361						1	0	0	1	300
Wisconsin	10	4	1,470	6	844						4	2	882	2	1,147
Minnesota	1	0	0	1	140										
Missouri	3	2	677	1	240						8	1	425	7	3,355
Texas	2	1	210	1	100										
Oregon	1	1	160	0	0										
Colorado											2	1	480	1	480
Utah	1	0	0	1	80										
Washington	1	1	250	0	0										
Total	168	66	12.291	102	12 308	196	104	30,772	92	:3 362	224	146	91.752	78	36.979

THE SHIFTING OF STOVE CENTERS.

In his recent annual report, Mr. D. M. Thomas, Secretary of the National Association of Stove Manufacturers, brought out the following interesting points in regard to the shifting of stove-manufacturing centers:

The transfer and localization of trade is another element of this complex question. Formerly the principal production of stoves was confined to a few prominent localities where materials were produced and obtained at low rates, and skilled productive aad directive labor available. To-day the immense railroad facilities has so increased the transferability of materials over that of product, that in locating a stove foundry, the market is the important and governing quantity. In his address to the Association, June, 1873, Mr. Perry quoted the prices of pig iron at the various stove centers as follows: Boston, $52; Louisville, $50; Cincinnati, $50; Philadelphia, $48; New York, $47; Pittsburgh, $44.

To-day, a good mixture of foundry iron, such as is used for stoves of first quality, can be bought in Louisville as cheap as at Pittsburgh, if not cheaper. Then, Chicago and the South were not thought of as iron markets, certainly in either place iron would have cost as much as at Boston. To day pig iron is as low in Chicago as in Pittsburgh, and in the South it is lower. The great West, even in its smallest cities, now has its iron, its sand and its labor at as low prices as Albany or Philadelphia or New York, and, being a large market, is in a measure producing its own stoves. This, of course, necessitates increased competition. Those who had the trade want to hold it, and are struggling to hold it, while those who are located near the market want the trade and try to take it, with the result that competition has become predatory, approaching the ruinous, and the mere effort to survive seems to engage the whole energy of manufacturers. The discovery of iron deposits, the advent of new blast furnaces in and the transference of manufacturing establishments to, the South and West has also had a strong effect, necessitating a readjustment of competive attempts, and engaging in all its force the resistent power inherent in our members. Localization of trade is also greatly stimulated by the more modern practice of small cities endeavoring, by the gift of land and money, to induce persons to establish manufacturing industries in them, so increasing their population and growth. This will, however, in course of time, correct itself; for it is not only opportunity that is requisite to success, but the power to organize, to foresee contingencies, as well as other necessary qualifications. There is a process of natural selection continually going on among foundry men which deters capital alone from possessing the trade. Temporary loss may be borne, but not permanent waste and inefficiency. The life of a concern based upon mere opportunity is short.

A Restaurant in a Steel Works.

Knowing by actual experience and observation that shop men have no great love for the dinner bucket, an article in the *Post*, of Pittsburgh, entitled "Good-by Dinner Buckets," attracted our attention. We found the article to be an account of a restaurant, recently started at the "Crescent" Steel Works for the accommodation of the workmen by the owners, Miller, Metcalf & Parkin. It seems that for some time past there has been in the works a dining-room for the clerks and officials employed in the offices, and the idea occurred to extend the system so as to include the shop men. A second story was added to the machine shop, and fitted up for the accommodation of about ninety men, and, we should judge from the account given in the *Post*, it is a move likely to become very popular.

Not only is the room elegantly fitted up and furnished, but the bill of fare is excellent; and from the fact that provisions are bought at wholesale prices, and meals furnished to the men at cost, prepared by a competent cook, using the best of modern appliances, it will be seen that there will be little further use for the despised dinner pail, and no necessity for going out to lunch-rooms where questionable, if not positively injurious stuff, is served up at exorbitant prices. We hope and believe that the plan will succeed, and that Messrs. Miller, Metcalf & Parkin will have no cause to regret the establishment of the enterprise. It is distinctly announced that there is no element of charity in the matter, but it is simply a case of co-operation between employer and employes for mutual benefit.—[American Machinist.

THE OVERPRODUCTION OF COKE.

Connellsville (Pa.) Courier.

Coke is fast becoming the universal furnace fuel, but production promises to more than keep pace with the demand. The result of such a condition was strikingly illustrated by Micawber in the following terse but expressive language: "Income, ten pounds; expenditures, nine pounds six; result, happiness. Income, ten pounds; expenditures, ten pounds six; result, misery." So it is with the coke trade. As long as production falls within the demand, prosperity reigns; but as soon as overproduction puts in an appearance at the door, profit flies out at the window.

In spite of the immense growth in trade that enabled the operators of the Connellsville region to increase their monthly output from 20,000 cars in January, 1888, to 28,000 cars in January, 1889, the coke trade of to-day labors under an overproduction. A large proportion of the works cannot run full time, there being no market for their entire product.

This condition of affairs, however, has been brought about by the opening up of new fields rather than by the construction of new plants in the Connellsville region. Five years ago this region was practically without a rival. Now it is confronted with the Flat Top, the Kanawha and the Upper Monongahela regions of West Virginia, the Tennessee and Alabama regions, and last and most threatening, the Central Pennsylvania region, whose rapid growth is elsewhere described.

While the cokes from none of these localities are the equal of Connellsville coke, they can, in many instances, be laid down in competing markets at a much less cost than the latter, and, being merchantable cokes, find ready sales. The result is overproduction. It is not an overproduction of the Connellsville region, but the Connellsville region bears the brunt of the evil, because its operators refuse to agree upon any combination to restrict their own production and maintain their own prices.

The wisdom of the extensive plant projected to Central Pennsylvania may well be questioned. But there can be no question about the wisdom of the Connellsville operators in refusing to pool their product. That is not wisdom; it is folly.

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CLEVELAND, O., FEBUARY 28, 1889.

PROPOSED RAILROAD CONSTRUCTION IN OHIO.

Although, in Ohio, railroad building is not pushedwith the same activity as it is in newly settled States like Nebraska and Kansas, it cannot be said that interest in new construction has entirely ceased. The old companies, generally, pursue a conservative course, and rarely add to their mileage, and hence a large part of the new construction is by new companies; and although the actual mileage increases but slowly each year, the amount projected is considerable. It is a great State for "schemes." It does not cost much to get out a charter, and any one can build a railroad almost anywhere—if he can get the money. Out of the many schemes proposed, a few get substantial backing and are pushed through.

In this connection, we have been at some pains to procure a list of such new railroad enterprises in Ohio, as are claimed by their projectors to have passed the merely preliminary stages of chartering, etc., to such a point that actual construction work is about to be undertaken. The first, and perhaps the longest line, is the Sandusky, Ashland & Coshocton road, which is to extend in a southeasterly direction from the lake at Sandusky, through Norwalk, Ashland, etc., to the coal fields of Southeastern Ohio. It will be a coal carrier, similar to the Wheeling & Lake Erie and the Cleveland, Lorain & Wheeling, its line being in the same general direction but lying further west. The projector of the company is Mr. W. D. Crane, of No. 45 Broadway, New York, and it is announced that construction work is to begin at an early date, funds having been secured by the sale of mortgage bonds in England.

Of special interest to Clevelanders is the proposed New York & Ohio Railroad to be built from Greenville, Pa., to Hudson, Ohio, a distance of some 65 miles, most of the way on the roadbed of the old Clinton Air Line, which was graded in 1856. At Greenville connection is made with the Erie & Pittsburgh and Erie, and with the Pittsburgh, Shenango & Lake Erie Railroad. At Streetsboro connection is made with the Cleveland, Canton & Southern, and at Hudson with the Cleveland, Akron & Columbus. Though the road passes through no large towns, it is claimed that by reason of former grading, etc., it can be cheaply built, and that by favorable arrangements with the Cleveland, Canton & Southern for an entrance into Cleveland, and with the Pittsburgh, Shenango & Lake Erie at Greenville, it will be a coal carrier from the Western Pennsylvania fields to Cleveland, and thus secure a large traffic. The President of the company is Hon. Horace Scott, of Louisville, an experienced railroad man, and the Vice-President is Col. David M. Yeomans, of Kinsman, Ohio, a well known promoter of American inventions abroad, who was instrumental in introducing the Pullman sleepers, the Westinghouse brake, etc., into England. Edwin Youmans, of Hudson, is Secretary, W. C. Agnew, of Youngstown, Chief Engineer, and M. C. Read, of Hudson, Attorney. A bridge is to be built across Grand River, at once, and five miles of track are now being laid.

The Toledo, Columbus & Southern has been sold under foreclosure to Judge Stevenson Burke and others, and hence may be said to be substantially a part of the Toledo & Ohio Central system, and an extension from Findlay south through Dunkirk, Kenton, Ridgeway and Marysville, and thence to Columbus is now promised. The extension in question is a natural and legitimate one, and will no doubt be carried out.

The Columbus, Lima & Northwestern is an enterprise which has been pushed for several years by B. C. Faurot, the well-known banker and strawboard manufacturer of Lima. They are now advertising for proposals for construction, and one enthusiastic news gatherer at Lima recently announced the line in question as a great through route from Charleston, S. C., to Grand Haven, Mich., but we presume the officers have more modest expectations as to what can be done in a year or two.

The Wheeling & Lake Erie are at work on an extension from Bowerstown to Wheeling.

Messrs. James Callery and John Humphreys, who are largely interested in the Pittsburgh & Western, which operates a line from Allegheny, Pa., to Akron, O., and in a link of 56 miles of narrow gauge railroad from Delphos to Carey, are seeking to fill up the gap of some 100 miles or more between Akron and Carey, and have been doing some grading near the west end. Mr. W. C. Mobley, of Carey, is manager, and Mr. W. A. Lynch, of Canton, is one of the active organizers.

The New York, Mahoning & Western Railroad Company, which has been formerly known as the "Continental," "American Midland," "Forty-First Parallel" and similar names, and has proposed, at various times, to build "a great through double-track, steel-rail trunk line from New York to Council Bluffs," actually built 20 miles last year from Findlay to Ottawa. The contractors and material men got out liens duly sworn to and filed, amounting to $250,000, which, with the required experience, is said to represent the proceeds of their venture. One C. N. Haskell, formerly an Ottawa attorney, seems to be at the head of the enterprise, and asserts confidently that the road will be completed to Ft. Wayne, Ind., by June 1st.

As to extensions of roads centering in Cleveland, those under way by the Cleveland, Canton & Southern seem relatively the most important. The new line to the Shenango Valley, by way of Col. Yeomans's New York & Ohio, and the extension from Coshocton to Zanesville, sensibly increases the area of territory tributary to Cleveland, as the extension of the Cleveland, Akron & Columbus to Zanesville, last year, has already done.

As to new projects, it is to be noted that there is renewed talk of the possible extension of the Erie from New Lisbon to East Liverpool, and of the Cleveland, Medina & Wooster line which would, if built, place a large and an important near-by territory in needed direct communication with Cleveland.

President Wade, of the Valley, is reported as expressing himself that that company feels greatly hampered in its natural expansion by the terms under which it acquired its valuable terminals from the city, in that such terms prohibit the company from consolidating with others. Just what extensions are in contemplation, is not stated, but a glance at the map shows that the Medina-Wooster line might possibly interest the Valley people; also a line from Akron to Alliance, Salem and East Liverpool would be especially valuable as a coal, fire-clay and stoneware line, while it would seem that the valuable Valley terminals might be used in handling the traffic of various tributary lines of this character. Mr. Wade has given no hint of intentions, but they seem so natural an expansion of his road we cannot well refrain from mentioning them.

Although using the Cleveland & Pittsburgh tracks from Hudson, the Cleveland, Akron & Columbus is so important a road to Cleveland, that it is of interest to note that by the construction of the New York & Ohio, it secures an Eastern outlet and an alternative route to Cleveland over the Cleveland, Canton & Southern in case there should ever be a rupture with the Pennsylvania Company.

AS TO OIL FUEL.

The development of the uses of crude oil as a fuel for manufacturing purposes, although of comparatively recent date, has none the less established petroleum fuel as an active and constantly growing competitor of coal and other fuels. Although the calorific properties of oil fuel have for a long time been known to those more especially interested in that field, it remained for the recent past to demonstrate the entire practicability as well as the great economy resulting from the use of crude oil for fuel purposes.

It is well understood that a very large item of the cost of a manufactured article is the matter of fuel consumed in its production; and so while for years and years oil has been used as an illuminator, its great cost in excess of other material has kept it out of the line of active competition. It was only when an economical use of oil fuel was brought into play that a new channel of commercial use was opened to the crude oil of the Ohio fields. As the demand for oil fuel increased, device upon device was projected, each with a view still further to increase the saving of oil—that is, to increase the work of oil as a calorific factor, and at the same time to reduce the quantity of oil used. It is obvious that the manufacturer would be most apt to adopt that mechanical contrivance, the use of which would create for him the largest amount of steam or heat, as the case may be, in connection with the least possible consumption of oil, and therefore a corresponding reduction in the cost of fuel.

It is well to remember also that many attempts hitherto of substituting liquid fuel for coal or coke have not turned out successfully in a financial sense because of the crudity, inadaptibility and hap-hazard construction of the medium through which the oil was transformed into heat. It was known all along that the knowedge of the economical use of oil was but in its infancy, and while a great number of inventions in the way of burners were soon offered to the trade, none fully answered the purpose of converting oil into heat in such a method and at such cost as would warrant any manufacturer to perceive at a glance the advantage in every respect of substituting oil for any other fuel.

The burners of the future must be simple in construction, durable, easily operated, and free from leakage, dripping and waste, and its inventor may be sure of a fortune.

AS AN illustration of the activity with which the production of rails is being developed in Austria, a correspondent of an English paper states that whereas formerly 50 tons of rails used to be produced at the Graz Works in twelve hours, and for every ton produced 22 per cent. had to be reckoned for waste, with a consumption of fuel amounting to 1,010 kilos. (about 2,000 pounds), they are now turning out from 100 to 110 tons of rails in twelve hours, the waste only amounts to 12 per cent., and the coal used to produce a ton of rails does not exceed 730 kilos. (1,500 pounds). The Martin furnaces employed at these works have a basic lining, which can stand 350 to 400 charges, or considerably more than was the case when Dinas fire-bricks were used.

NO LESS than thirty-nine wells have been drilled for gas during the past year along the lake shore, between Erie and Cleveland. None of them have been failures. The wells, although not very strong, produce a steady flow sufficient for local needs. A few of the numerous wells drilled at Painesville are not as strong as at first, but the majority of the thirty-nine are considered stronger than when first struck. Not much has been heard of late of the gas well sunk in Newburgh, near this city.

IT is to be remarked that, though that excellent iron authority, the Crystal Falls (Mich.) *Diamond Drill*, was peremptorily sent to the scrap heap of defunct journalism by a misleading dispatch, it is still in full operation, each week bringing up cores of mining news of much interest and value.

FOUR THOUSAND YEARS.

BY PROF. J. F. ELSOM.

Written for the IRON TRADE REVIEW.

[Continued.]

From the standpoint of modern engineering it seems easier to conduct water where it is needed than to restrain its overflow, in such instances where its encroachment is productive of devastation, and even want and wretchedness as followed the overflow of the Ohio a few years past, but the people of many many years ago did not consider it such. While traveling in Holland, and seeing the works left by the older Dutch, it must be conceded that the Hollanders have accomplished more than nearly every other nation in this respect. They have actually been compelled to great exertion by their sea-encompassed land in the northwestern part of the realm, which for centuries has been wholly dependent on the art of man, showing in this instance, at least, the greatest achievements were conceived and nurtured by the necessities of the people.

At what particular period in Holland's history her people began this ceaseless struggle with the sea, I was unable to ascertain, though there are countless evidences of dykes which were built in the eleventh and twelfth centuries, for the purpose of protecting the lowlands from the overflow of the sea. Then followed those bold voyages and successful commercial enterprises in the spice lands, the daring ventures of the whale fishermen in the Arctic waters, in consequence of which the Netherlands grew in prosperity, her population increased in numbers, artisanship and science were encouraged and works of the most magnificent proportions were undertaken, developed and fostered. Science bade defiance to the sea, canals were made and gigantic machines were constructed to pump dry entire seas, if need be. The great canal of North Holland, completed in 1825, was for a long time the largest canal in the world, but the Suez canal eclipsed it, running all the way, with its gigantic sluices from Amsterdam to the North Sea. After pumping dry the Harlem Sea, transferring its bed into a fruitful plain, the colossal question is agitated, with the greatest feasibility of doing the same with the Zuyder Sea.

In giving the Hollanders due credit as being the teacher of the world in canal enterprises, let us not forget to credit the French with their improved roads, particularly during the past century. This country of ours cannot be considered an authority on roads, at least, and I will wager a year's subscription, in blocks of five, to the IRON TRADE REVIEW (just think of such reading as this for a whole year!) that the sun does not shine on any land that can show such poor excuses for roads as the United States. I have eaten and slept in every civilized kingdom and never saw worse ones, and if ever Road Commissioner is made a cabinet office, and a dwarf like me asked to fill the position—address furnished to those interested—the roads of this country shall be made better. The provision of other means of transportation is but a step when we have good roads. The French found it so, and her other facilities for commercial intercoarse followed her improved roads as a natural sequence. Wooden clouts were first used in the Hartz mining works, in the seventeenth century. The first iron ones appeared in England in 1738, and was the ultimate origin of the railroads of to-day.

The greatest revolution in the commercial world, however, was brought about through the introduction of the steam engine. At first, as might be expected, the magnificent *role* to be played by Watt's invention was not even thought of, and great was the wonder manifested at its actually controlling water and windmills, and replacing horse-power in the tread mill. Deep mines from which the water had hitherto only been removed by the excavation of costly galleries, were now pumped dry. The slow work, in a word, of hands and fingers, of bone and sinews, was directed to other uses, and thus was obtained the equivalent of a thousand fold increase of hands. Immense armies of men could thus concentrate their forces and strike as a unit when needed.

At that time the world was not ready for steam as a means of commercial intercourse, it was needed more as a servant of industry, the necessities of the means did not become sufficiently urgent to justify the next step. The most subtle and remarkable effects of all was the application of steam to spinning and weaving. The people's necessities demanded this, hence the application, and what miracles has steam not worked in the manufacture of all kinds of cloth? Known in the Indies already in the earliest times in history, cotton did not make its appearance in Persia and Egypt until just before the advent of the first century in our computation of time. In Spain it was woven in the tenth, in Italy in the fourteenth century, and Manchester to-day, the greatest cotton market in the world, first became acquainted with cotton late in the seventeenth century. Good, old honest linen, known among the Egyptians, the mummies being many of them wrapt in linen cloth of the finest texture; but linen had to step aside for cotton. Away back among the Babylonians had, besides woolen materials, linen garments of superb coloring and beautiful designs, and though the march of cotton was onward and rapid, many now living not yet in the sere and yellow leaf have witnessed its stillmore triumphant march to prominence. Aye, the generation now active has witnessed the greatest triumph of all, the introduction of steamboats, telegraphs, railroads, telephones, breech-loaders and stem-winders, not forgetting electric sugar-refining.

It is now only about a half century ago that a celebrated Englishman—honor to my dear old home again—declared, as the result of science, that the ocean would be crossed by a boat with steam for her sole power. He was jeered and ridiculed a year later, but in 1838 the passage from Bristol to New York was made in seventeen days by the Sirius, the first vessel that ever crossed the ocean by means of steam alone. The ship, Savannah, having made the trip from America to England partly by wind and partly by steam along in 1836. Then came the Great Eastern, which plowed through across the Atlantic in thirteen and one-half days. From that time on steam travel across the ocean was established, but if a vessel was thirteen days crossing now, she would not get passengers and freight enough for ballast.

The history of transatlantic steamship intercourse is by no means ancient, and steamers have not yet, even, freely superseded sailing vessels in ocean travel. No earlier than 1860, the total number of European ocean steamers was but 2,914, while her sailing vessels numbered an even hundred thousand or more. In three years the number of steamers increased to 6,228, and the sailing vessels was about the same as thirteen years previously. Then, during thirteen years, European marine commerce gained an addition of 3,254 steamers, holding her own scarcely in sailing vessels, leading to the conclusion that six times as many steamers as sailing vessels are built. With the increase of steamers is, of course, abbreviated the term of delivery as well as increased the amount of freight and passengers possible to be carried; for every ton of freight which a steamer has a capacity for carrying, is equivalent to four tons of a sailing vessel, for the simple reason that a steamer can make about four trips while a sailing vessel makes one.

We arrive now at a period in the world's history replete with marvelous achievements, both in mechanics and science. No one has any idea how long the idea of the telegraph slumbered before awakening to life and activity, nor how many who worked out its most obtuse problems and carried the secrets and solutions with them to the grave, but we all know that a long, wearisome time was required by the electric telegraph, even after its invention, before it came into general use. Munich and the observatory at Bergenhousen were connected by the first perfectly adjusted electric telegraph; in 1838 the London-Blakewell railroad introduced and adopted it. From this start the telegraph found the world an easy foe to conquer. Telegraph wires and cables, now, fearing neither water or desert, encompass the whole world, for it has

> Crossed the Andes mountains,
> And stemmed La Platte's tide,
> Runs beneath old Egypt's fountains,
> From every land the records of pomp, woe or pride.

Japan, China, London, Vienna, in fact everywhere, has pages upon pages of their history on the breakfast table of civilized man. The cable connections between Europe and America is so thoroughly insured that many concurrent lines preclude the possibility of a break in the telegraph communication between the Old and New World, and even with far off Australia, for twenty years we have stood in regular communication. The length of the telegraph lines of the world is nearly a quarter of a million miles.

With the perfection of the telegraph, it seems that genius was awakened from his lethargy, was inspired with renewed zeal, as he went forth on his rambles again, and though the marine minds of the future may derive means by and through which the electric telegraph and the railroad may be rendered superfluous. As they stand to-day, relatively and collectively, they represent the most gigantic intellectual achievement the world ever before saw.

[To be continued.]

18,000 OR 20,000 H. P.

The Engineer.

The great experiment of the past year has been the Inman and International Company's steamer City of New York. She was intended to make the run to New York in six days. The Etruria has crossed the Atlantic in six days and one hour, but this was an exceptional run, and the average performance of the Etruria is more like six and a half days. Consequently the City of New York must be somewhat faster than the Cunard boats. Up to the present she has failed to attain the expected speed, but she is an extremely fast ship, and it is worth notice that in stormy weather she has twice beaten the Etruria by some hours as a consequence of her great size. The City of New York has been taken off the line for the purpose of undergoing some modifications, which, it is expected, will bring up her speed to the required point.

Calculation shows that certainly not less than 18,000 indicated horse power will be needed to drive the ship at 20 knots an hour. It is possible that more will be needed, because of the way in which the hull has been put together with vertical butt straps outside. Taking, however, as a basis 18,000 horse power, we find that nine boilers have been provided to supply it. These boilers are double-ended, with six furnaces in each; the boilers are about 19 ft. long, and the grates 6 ft. 6 in.; the boilers stand fore and aft, in groups of three; there are in all 54 furnaces. The Etruria, to indicate 14,000 horse power, has 72 furnaces; but she has only compound engines, while the City of New York has triple expansion engines. The area of her grates is approximately 1,250 square feet to produce 18,000 horse power. Then each square foot of grate must represent nearly 15 horse power.

It is a very easy matter to talk of 18,000 or 20,000 horse power; but few people, we think, realize what it means. The following figures may help them to form a conception of what the much despised practical engineer has to do and does. It is more than probable that the White Star boats being built by Messrs. Harland & Woolf will develop 20,000 horse power. At least, so rumor says; for, rightly or wrongly, it is asserted that they will have each 12 boilers and 72 furnaces, worked with forced draught on Howden's system. Assuming that the engines will require 18 pounds of steam per horse per hour, then 160 tons of feed water must be pumped into the boilers every hour, and 160 tons of steam will pass through the engines in the same time. In twenty-four hours the feed water will amount to 3,840 tons, occupying 138,240 cubic feet. A tank measuring 52 ft. on the side would hold one days consumption; or it would fill a length of 493 ft. of a canal 40 ft. wide and 7 ft. deep. Taking the condensing water at thirty times the feed water, it will amount to 4,800 tons per hour—115,200 tons in twenty-four hours; or, for a six days' run across the Atlantic, to not less than 691,200 tons, or 24,883,000 cubic feet. This would fill a cubical tank 295 ft. on the side—a tank into which the biggest church in London, steeple and all, could be put and covered up. The coal consumed will be 400 tons per day, which would fill forty wagons. This will require for its combustion, 8,600 tons of air, occupying a space of 222,336,000 cubic ft. It is impossible for the mind to take in the significance of these latter figures. It may help if we say that if this air was supplied to the ship through a pipe 20 ft. in diameter, the air would traverse that pipe at the rate of about 5.6 miles per hour. It will be seen that the circulating pumps and fan engines of such a ship have no sinecure.

Vapor Stove Matters.

The Executive Committe of the Vapor Stove Manufacturers' Association met in Chicago, January 17 and 18. Of the various business transacted, that by which the association obtained control of the patent turn-down tank, was the most important. Manufacturers, hereafter, if they wish to use this tank, must take license from the association, or subject themselves to the liability of prosecution; for, it was determined, suits will be begun against any and all infringing manufacturers, outside of the association, of course.

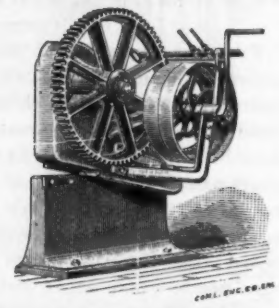
The outlook tor the vapor stove trade is considered good, and it is anticipated that 1889 will give as good results as did 1888. Prices were very low during past year and it is not expected that there will be any material change during this.—[Ex.

IRON shipbuilding has been averaging 35,000 tons per year in the United States, while it is ten times as much in Great Britain.

COLUMBUS MACHINE CO., Columbus, O.

—MANUFACTURERS OF—

Blast Furnace, Stationary, Portable and Hoist Steam Engines,



Boilers, of all descriptions; Rolling Mills; Drop Presses; Shears for Rail, Bar and Plate Rolling Mills; Punches and Shears—Single and Combined; Boiler and Sheet Iron Rolls—Hand or Power; Boiler Makers' Shears and Punches; Shafting; Couplings; Hangers and Pulleys.

Blowing Engines, and Blast Furnace Work in all its branches, a specialty.

Also HEAVY CASTINGS AND MACHINERY WORK.

☞BLAST FURNACE ENGINES ON HAND.

TINPLATES AND STEEL RAILS.

Bulletin of the American Iron and Steel Association

In his statement submitted to the House of Representatives, on Friday last, in opposition to the Senate tariff bill, Mr. Mills was especially lacking in candor in his treatment of the tinplate question. Referring to the proposed new rates of duty on tinplates, adopted by the Senate, he says:

"Tinplates are increased from 1 cent to 2.15 cents per pound. There were imported of these plates during the fiscal year ending June 30, 1888, 632,224,296 pounds, valued at $19,034,821. They paid duties at 1 cent per pound, $6,322,242, equivalent to 33 21 per cent. *ad valorem*. Under the change proposed by the Senate bill the duties would be increased to $13,592,822, or an increase on tinplate alone of $7,270,579."

In this conspicuously false and misleading declaration Mr. Mills utterly ignores the effect of protective duties in building up industries in our country which had previously languished, as the manufacture of tinplates has languished for Protection. He assumes that we will not make tinplates under the proposed new duties. The history of tariff legislation in this country shows conclusively and irrefutably that Protective duties both stimulate the manufacture of the products they protect and reduce their price to consumers. Mr. Mills knows all this, but he perversely conceals the facts. We will restate one signal instance of the beneficial effects of Protective duties in accomplishing both the results we have mentioned.

In the debate in the House of Representatives in 1870, on the bill of General Schenck, which fixed the duty on steel rails at $28 a ton, the Hon. Samuel S. Marshall, of Illinois, manifested great distress for fear that the proposed duty would be so high that it would to a large extent cut off the importation of foreign steel rails, thus depriving our railroad companies of the opportunity to buy the steel rails that they would need, "except the few made in this country, and which are sold at an enormous cost." At the time this sorrowful speech was delivered, in June, 1870, steel rails were selling in this country at $110 a ton, and the average price at which they were sold during the whole of the year 1870 was $106.75. The duty of $28 took effect on the 31st of December, 1870, and it did not produce any of the evil effects predicted for it by Mr. Marshall. On the contrary, it wonderfully increased the production of steel rails at home, so that in 1887 we made twice as many steel rails as Great Britain, and it so reduced their price that every steel rail made in the United States since Mr. Marshall's speech was delivered has cost our railroad companies an average of less than $44 a ton, whereas the price was $110 a ton in 1870. The present duty is $17 a ton, and the present price is only $28, and steel rails have been sold as low as $26, or lower than the duty of 1870. Protection established a new and important industry in this country, competition in the manufacture of steel rails for American railroads was created, and competition reduced prices.

Yet there were in this country in 1870 many persons mentally constituted like Mr. Mills who would not admit that we could ever make steel rails in large quantities, just as Mr. Mills and his associates now assert, or at least assume, that we can not make tinplates in large quantities if given a chance.

We hope that the new Congress will give us this chance. We have all the raw materials for the manufacture of tinplates except the tin to coat them, just as we have all the raw materials for the manufacture of steel rails except a sufficient supply of spiegeleisen and ferro-manganese, both of which articles we import in part. If we can successfully make steel rails by importing a small part of the raw materials needed in their manufacture, we can certainly make tinplates by importing the tin needed to coat them. That is what British tinplate manufacturers now do and have long done. Mr. Mills is working hard to maintain a British monopoly in our supply of tinplates.

Inspectors of Locomotive Boilers and Engines.

Power—Steam.

The United States Government has long since recognized the right of passengers upon vessels run by steam power to be assured that the boilers and engines were in good condition and in charge of a qualified engineer; but we fail to see why its good offices should not also be extended in behalf of the thousands of travelers upon the railways of the country.

The railroad engineer is certainly under a great responsibility in connection with the traveling public, and any lack of faithfulness or competency, on his part, might be attended with the most serious results. The explosion of locomotive boilers is by no means an infrequent occurrence, with a liability to damage others than those employed about them.

It is certainly within the province of the U. S. Government upon Inter-state lines to see that the boilers are in proper condition and in the hands of good engineers. It also seems a little inconsistent that the most insignificant power plant in this city is obliged to have a licensed engineer, while between 250 and 300 locomotives can be run through the principal streets uninspected and in charge of men of whom the public have no official knowledge.

The Cowles' Patents Sustained in Germany.

On November 29th, 1888, a final decision was rendered in the Imperial German Patent Office sustaining the Cowles Brothers' patented processes for the production of aluminum and other allows. Dr. H. Kunheim, of Berlin, was the complainant, and made a motion to annul the Cowles German patents, Nos. 33,672, 34,730, 35,579, on the grounds of their being anticipated by the following references, viz.: Sir C. William Siemen's English patent of 1879, and the other publications regarding the same; English patent granted to Benzon, No. 2,753, of 1858; the English patents to Camille Alphonse Faure in 1882 and 1883; John Calvert, patent of 1856, and many others. The office decided that in none of the citations were the processes anticipated, and the request for nullification on the part of Dr. Kunheim was, therefore, groundless.

It may be noted that the so-called Herault process is not patented in Germany. Their works were located in Switzerland a year ago, prior to the adoption of patent laws by that country, and it may be inferred that the above attack was instigated by the promotors of this latter steal of an American invention.

Work on the Nicaragua Canal.

The President has signed the bill incorporating the Nicaragua Canal Company, and the work of building the canal has been contracted for by the Nicaragua Canal Construction Company, an officer of which recently said: "We will begin work as soon as we can make the necessary arrangements. The total distance from ocean to ocean at Nicaragua is 169.8 miles, of which 56½ is by lake, 84½ by river and basin navigation, leaving only 28.8 miles of actual canal. There will be six locks in all, three on the Atlantic and three on the Pacific side of Lake Nicaragua. The greatest cut through rock will be three miles long, with an average depth of 120 feet. The size of each lock will be 650 by 70 by 30 feet, thus allowing for the lockage of the largest vessels afloat, such as the Etruria, the Umbria or the City of New York.

"The estimated total cost of the work by the surveying expedition of 1885 was $50,000,000 and $15,000,000 for contingencies, making $65,000,000. It is said that the canal will be open for navigation by 1895."

IRON AND STEEL AND "WATER."

National Labor Tribune.

The iron and steel industries depend for prosperity on the demand for supplies of the railroads. If it is known that this demand for any year will be large it is known that such year will be a prosperous year for those industries. Therefore, primarily the good, bad or indifferent condition of the iron and steel industries depends upon the railroads.

This being the fact, it follows that to make the iron and steel industries healthy the railroads should be in good financial health.

But the accepted statistical authority on the railroads states that the "water" in their capitalization is $4,000,000,000, or 50 per cent. of the entire capitalization.

This is a diseased condition that requires radical cure. The railroad system is as greatly out of order as the man who has 50 per cent. of his insides requiring medicine. Can any continuous effort be expected of such a man? Can he be depended upon at all? Is he not likely to fall prone and be laid out in a hospital at any time? Would any sensible person depend upon such man to keep a business engagement?

Surely the stomach and liver and kidneys of the railroad system are badly affected, and though both lungs appear to be good, yet they are merely inflated.

And this is what the iron and steel industries, profits and wages, depend upon so largely—a system that is 50 per cent. out of gear. This is what many other interests depend upon to more or less extent. Yet no measure has been taken to compel honest capitalization to tax out of existence the water in stocks and bonded debt. On the other hand, new railroads are permitted to be launched saturated with water. Recent examples in Pittsburgh—which may be regarded as illustrative of those of the whole country—show not less than 50 per cent. of "inflation" or "water," which are terms of the same meaning, both signifying wholesale larceny.

Assay of Dakota Tin.

Forty tons of tin mined in Dakota were sent to England for assay during the latter part of 1888. The London *Statist*, of December 15, published the result of the experiments, which were performed by Johnson & Mathey, assayers, Mr. Clandet, assayer to the Bank of England, Capt. Davies, of the Dalcoath tin mine in Cornwall, and Messrs. Bolitho, owners of tin mines and mills in Cornwall. Their report shows an average yield of 64.40 pounds of pure metallic tin to each ton of rock—over 3 per cent. In view of the fact that the best mines in Cornwall furnish but 2 per cent., or 40 lbs. of tin to the ton of rock, and that the Dakota tin needed no refining, the result is very flattering to the American product. Another test, subsequently made, yielded 66 per cent. of refined tin from Dakota ore. The outcome is eminently satisfactory to the mine operators.

Photographing Patterns.

Sterling Elliott sends to the *American Machinist* the following plan for keeping track of patterns:

Spread a white paper on the floor, lay patterns on it in proper order, place on each pattern a small square of white paper on which is painted a black, plain figure beginning with one, two, three, etc.; these may be cut from an old calendar, or painted purposely. Directly over the patterns suspend by any suitable means a photographic camera, and you have it. From the negative thus obtained, make two blue prints, send one to the foundry, and the old problem of marking patterns is not only solved, but lost patterns are much more easily found; for a pattern, unlike an actress, resembles its photograph every time.

TWENTY years ago there were ninety-two lightning-rod factories; to-day there are but three.

Industrial Notes

Blast Furnaces:—

The Kentucky River Iron Manufacturing Co. will move their charcoal iron furnace from Red River Iron Works to Clay City, Ky. shortly, and add car-wheel works to cost $60,000.

Messrs. Chas. Himrod & Co., the lessees of the Calumet furnace, inform us that during the month of January they produced 4,700 tons of Nos. 1 and 2 Coke Foundry Iron, and are now steadily making 1,100 tons a week. The furnace is working well in every particular.—[Industrial World.

A number of English capitalists have formed a $2,000,000 company under the name of the Anglo-Saxon Coal & Iron Co. They have purchased 50,000 acres about fifteen miles from Birmingham, Ala., and will commence at a very early date the erection of two 150-ton furnaces. They have made arrangement to have the Alabama Great Southern road run a branch, at once, to their property.

Machine Shops and Foundries:—

The Cincinnati Screw & Tap Company has reduced its capital stock from $100,000 to $50,000.

H. K. Porter & Co., Limited, of Pittsburgh, builders of light locomotives, made the second annual distribution of a percentage of the profits among their employes last week, and quite a large sum was given to the men.

Among the contracts awarded last week by the Navy Department were the following to Philadelphians: Joseph J. White, drilling machines, $875; Bement, Miles & Co., planing, punching, straightening, bending, countersinking and drilling machines, $16,020.

The Eclipse Wind Engine Co., Beloit, Wis., report they are so full of orders that they find it necessary to run their clutch department day and night. They have already taken steps to again enlarge their works, and increase their facilities for turning out their clutch specialties.

The Aetna Machine Company, Warren, O., received an order on Monday last, for two of Smith's gas furnaces and valves for the Harman Steel Company, Beaver Falls, Pa.; also an order for one of Smith's large gas furnaces and valves for the Chicago Horseshoe Company, Chicago, Ill.

Brown & Sharpe Mfg. Co. have this year enlarged the line of their tools at the store of their Western representative, S. A. Smith, 23 South Canal street, Chicago, and now have there samples of plain and universal milling machines, surface grinders, face grinders, tool grinders, cutter and reamer grinders, screw machines and hand lathes. This company also have tools at the store of their New York agent, E. P. Bullard, 72 Warren street, New York.

Says the Findlay (O.) *Republican:* While on his rounds yesterday, a *Republican* reporter wandered out to the extensive new manufactory of the American Nail Machine Works, in the south part of the city. To say he was surprised at the magnitude of the plant of this new acquisition to Findlay's many manufacturing industries is placing it in mild form. The buildings, which are all constructed of Findlay limestone, cover an immense area of ground, the main building being three stories high and the foundry and machine shop one story. The three-story structure is occupied as a warehouse on the first floor. The second floor is devoted to pattern-making and the carpenter work necessary to such an institution, and the third floor is neatly fitted up for the draughtsmen. The company is now getting well under way with the construction of their high-speed engines, and will soon be able to fill the orders now on file. We were shown the 75-horse-power engine with which the works are run, and were ready to admit that it was truly wonderful, the engine not taking up much more space than an ordinary base burner stove. We were also shown the drawings for a 60 horse-power double engine which they have under contract for the Bell Pottery Company, of this city, and which they expect to have in readiness in about six weeks. They manufacture the high-speed engines in all sizes. Machines for making cut nails and wire nails were being made in abundance, and they already have quite a stock of this class of work on hand. The institution now furnishes employment to about seventy-five men, and as soon as the balance of the machinery can be placed in position and the line shafting completed, the force of workmen will be doubled. The superintendent informs us that all the employes are bringing their families to Findlay as rapidly as they find houses for them. Many of the men now occupy the new houses just completed, near the works.

Hardware:—

Incorporated: Walcott Manufacturing Co., Chicago; capital $100,000; to manufacture heat, traps and hardware; incorporators, A. Walcott, F. W. Childs, and M. R. Diall.—Novelty Lock Co., Chicago; capital $200,000; to manufacture locks and light hardware; incorporators, W. A. Gardner, P. Hale and W. Rice.—Rock Island Novelty Co., Rock Island; capital, $10,000; for the manufacture of machinery for household use and other novelties; incorporators, W. C. Collins, E. H. Collins, W. F. Henderson, F. H. Sheperd, J. W. Meyer and W. Jackson.

Nes Chain Manufacturing Co., York, Pa., announce that they have erected a plant for the manufacture of all kinds of iron chain, and start operations at once, intimating that they will be ready to supply promptly all orders for shipment March 1 and later. Chas. A. Nes, the managing partner, was connected with John C. Schmidt & Co., and his brother, David S. Nes, is the other member of the firm. Chas. P. Leeper, formerly superintendent of York Chain Works, is superintendent.

The Western Automatic Machine Screw Co., Elyria, O., which Western branch of the Hartford (Conn.) Machine Screw Co., is prospering. There are now 215 automatic screw machines in operation in the works, making screws from 1-32 of an inch in diameter to 2 inches, besides a great variety of specialties for all kinds of machinery from watches up to steam engines. The material used is brass, steel, iron and white metal. There are 78 men employed in the institution with an annual pay roll of $40,000, and the business is on the increase.

The Columbia Injector Co., Cleveland, report an increased demand for their patent injectors. Among their recent sales is one No. 50, which, under 80 pounds steam pressure, will throw four thousand (4,000) gallons per hour, sold to the Wheeler Furnace Co., of Sharon, Pa., for their works at Middlesex, Pa., to furnish water for a boiler of (800) eight hundred horse-power capacity. The Columbia Injector Co. have earned a reputation for promptness and skill in turning out orders for specials. The Cleveland Rolling Mill Co. recently gave them an order for one dozen shafting hangers, of special pattern, which were furnished within four days, notwithstanding the patterns had first to be made.

Fires in Iron Works:—

Bellaire, O.: Parks & Lewis (Ohio Valley Foundry), will rebuild.

Cincinnati, O.: Machine shops, car shops and locomotive house of Indianapolis, St. Louis & Chicago Railway. Loss, $200,000; insurance, $100,000.

Columbus, O.: Ohlen's saw factory. Loss, $40,000; fully insured.

Worcester, Mass.: No. 2 copper wire mill of Washburn & Moen Manufacturing Co. Loss, $30,000; fully insured.

Montreal: Peck, Benny & Co.'s foundry. Loss, $100,000; fully insured.

Tiffin, O.: Green Nail Works. Loss $50,000; no insurance.

St. Louis, Mo.: Hardware works of Ette & Henger. Will rebuild.

Miscellaneous:—

The Cramps have at work in their yard, at Philadelphia 2,200 men. This force is engaged in construction work on a gross tonnage of 24,257 and a total horse power of 45,280.

A company is about formed to lease the site of the Beaver Falls (Pa.) Car Works, recently destroyed by fire, and erect a large mill for the drawing of cold-die shafting under the patents of W. A. McCool. The mill will employ a great many men. It is said that Mr. McCool and the Cambria Iron Works, of Johnstown, are the principal parties interested. The works will be run by water power.

The Brush Electric Co., of Cleveland, have recently received another order from the California Electric Light Co. for a new plant consisting of a sixty to sixty-five light arc machine with lamps, etc. This plant is to be used on the Pacific coast.

The Circuit Court, at Lexington, Va., has just chartered a new organization, called the Tippecanoe Land Improvement Co., with a capital of $5,000,000, to operate in the iron belt of the Blue Ridge Mountains. The plan of the company is to locate towns, build smelting works, erect mills and do a mining business on a vast scale. James G. Blaine has invested largely in the enterprise. His son Walker is a director. Many other prominent men both East and West are stockholders.

The Canton Steel Roofing Co., have lately moved into their new works; size of building 200x90. This is one of the most complete shops in the state, having all new and improved machinery. This company's trade has grown steadily the past few years, the product being shipped all over the country.

The Youngstown Stamping Co., Youngstown, O., is really the old Pittsburgh house of Duncan, Wilson & Co., who removed to Youngstown about two years ago and organized a stock company under the name as above. The company occupy the works formerly occupied by the Forsythe Scale Co., and in addition to their line of stamped, pieced, and japanned ware, etc., make the "Friend" tin mounted glass oil can, which is a great favorite with the trade wherever introduced. They also make the "Magic" glass fruit jar, which has the neatest, most secure and most readily closed or opened clamp for fastening on the lid that is in the market. The officers of the company are: R. L Walker, President; I. G. Blackman, Vice-President; W. C. Hine, Secretary and Treasurer; A. J. Duncan, General Manager.

Chicago, or more properly speaking, South Chicago, says the *Industrial World*, is soon to have one of the most extensive and best equipped boiler shops in the country. Its capacity will be far ahead of anything now in the city. Mr. George A. Porter, of the Porter Manufacturing Co., Limited, Syracuse, N. Y., manufacturers of automatic engines, is now negotiating for the sale of his interest in this concern. He, together with Mr. C. E. Jackson, who has in the past represented the Porter Co. in Chicago, have formed a partnership under the firm name of Porter, Jackson & Co., and have bought the old plant of the Chicago Forge & Bolt Works, at South Chicago, with the intention of turning it immediately into a large boiler-making establishment. Some of the heavier tools and machinery have already been ordered, and are now on their way here. The bending rolls will be the largest in the West, as they are 20 feet long, and with their housings will weigh over 80,000 pounds. Hydraulic riveting machines will be used, and the punching and shearing machines are to be of a very substantial order.

New Rolling Mill at Chicago.

It is announced that the building of a new rolling mill at Chicago will soon be commenced. It will be operated by a corporation under the name of the National Forge & Iron Co. The capital of the company will be $250,000. The president and principal stockholder is Marks Swarts, senior member of the firm of Swarts & Nathan, well-known dealers in scrap iron. He will have associated with him Wm. J. Quailey and other practical rolling mill men. Seymour Swarts, his son, is secretary and treasurer. The exact location of the proposed works will be made public shortly. The office is located at 557 State street for the present. The machinery will comprise two trains of rolls, one 10-inch and one 18-inch; six shears to cut small iron, scrap; etc.; two large steam hammers; one rotary squeezer, six busheling furnaces; three double heating furnaces; one extra shingling furnace; and three heating furnaces for the forge. The works will make a specialty of iron for railroad cars, car axles, etc., but will also make all sizes of merchant iron and fish plates. Oil will be used for fuel.—[Philadelphia Bulletin.

About Metal Ties.

The use of metal ties, even as an experiment, has hardly begun in this country, and it does not seem possible that they will be greatly used here for many years to come. While the relative cost of wooden and metal ties remains near what it now is, the convenience of the wooden tie in track work and the admirably elastic bed which it makes, will cause it to be generally used. We may expect also that the life of wooden ties will be further increased, and the cost of maintenance reduced by the use of metal tie plates of improved forms and probably by better and cheaper methods of preservative treatment of the timber. We look to see both these expedients well tried and exhausted before the metal tie comes into great use.—[Railroad Gazette.

One of the latest advances in electrical illumination is the lighting of the London omnibuses with electricity, the battery to be under the seat of the driver.

STEEL BLOOMS BILLETS SLABS — W. F. THORNTON — CLEVELAND, O.

SOFT STEEL.
Plates and Sheet.

CORRUGATED ROOFING.

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Malleable Iron, Composition, Wrought and Steel Forged Goods made to order. Finished in Japanned, X. C. Plate, Imitation Rubber, Nickel, Silver and Gold Plated and Genuine Rubber Covered.

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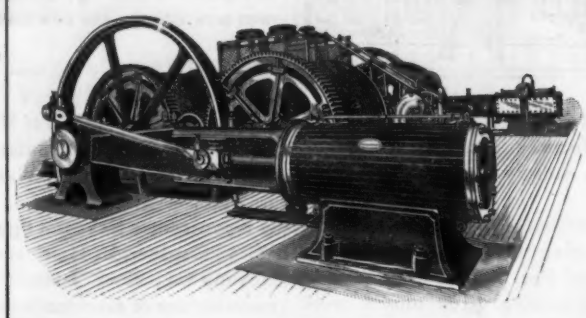

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SMITH & TEACHOUT—(Established 1857.) Boilers, Tanks, Stills, etc. 644 Broadway.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

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PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

File Works.

INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

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THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 25

Hardwood Lumber.

MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

FISHER, WILSON & CO., Wholesale lumber dealers (pine & hardwood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way. 82

Machinists' Supplies.

PARKIN & BOSWORTH, 9 and 11 So. Water St., dealers in Manufacturers' Supplies, Machinery and Tools.

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Canton, O.

NOVELTY IRON WORKS, Mill Work, Shafting, Engines, Imperial job printing press etc. 73

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CURRY & CO. general jobbers in Castings of all kinds. 43

Mansfield, O.

MANSFIELD STEAM BOILER WORKS, Man'frs of Steam Boilers, Oil and Water Tanks, and all kinds of Sheet Iron Work. 03

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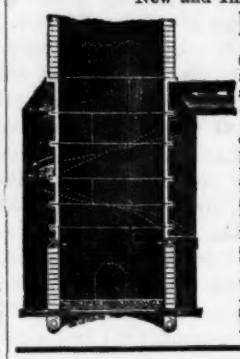

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MARKET REVIEW.

Iron Ore.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, February 27, 1889.

A year ago, when the sales agents—who are supposed to know the market and its changing phases—delayed the offering of ores until the very eve of the opening of lake navigation, there was a great deal of doubt expressed by persons ordinarily well posted on the subject, as to the result of late sales. The first sales, to be sure, were made cheaply, but the market acquired tone later on, and the prices that ruled toward the close of the season were remunerative. This year, the ore men, as a rule, feel decidedly firmer. Indeed, the sales agents representing the largest mines, feel so confident of their position that, even in the event of some early sales, at last year's prices, by some over cautious mine, they will hold up the price to what they consider a fair figure. If this resolution be carried into practice—and no good reason seems to exist to the contrary—it is only a question of time when furnacemen must come to the ore dealers' terms. The ore interests represented in this position exceed in productive power four-fifths of the possible output, and the dealers are firm in their determination to "fight it out on this line," if it takes until May 15. The vesselmen, too, will insist on fair charters, and the longer they wait, the more reasonably sure they can feel of higher rates. Opinions are divided as to the probable output for '89, but that a good trade is expected, is evident from the preparations that are made by several of the companies materially to augment their production. It is proper, however, to state positively that no ore has been sold, either at last year's or any other price, and that all the chances favor the position taken by the producers, viz., to sell only at fair prices, when a demand shall have arisen for ore.

Pig Iron.

The rose-colored correspondence in an Eastern trade journal notwithstanding, the market is at the lowest possible ebb, and unless an improvement is noted before long, something, in the language of a leading furnaceman, "is going to smash." When a prime foundry iron is sold at the furnace at $16, and mill iron is hawked about at $13.50, the situation can hardly be considered encouraging. The result is that the big stacks, having accumulated heavy stocks of iron, are either blowing out, or are preparing to do so at the first favorable opportunity. Some of the smaller concerns have been seriously pinched for ready money, and some sales have been noted in consequence which have done their share in demoralizing an already weak market. To be sure, the larger firms decline to part with their stocks at sacrifice prices, but they cannot obtain living figures until the supply of cheap iron, that must be sold at any price, is exhausted. Sales continue in 50-ton and car lots, but that is all. One heavy consumer of pig iron who made the round of the city firms, this week, is on record as offering to invest $50,000 in mill iron at $13, but no one here cared to take him up. On the contrary, several furnaces who had been offering iron at specially low figures, have withdrawn it from the market, preferring to wait until they may sell it at legitimate quotations. For the present, everybody and everything connected with the pig iron business is "in the soup," with a very slim prospect of being fished out soon. We continue to quote, f. o. b. cars, Cleveland, four months:

No. 1 Bessemer	$17 50@18 00
No. 1 foundry	16 70@17 20
No. 2 foundry	15 70@16 20
No. 1 gray forge, red short	14 70@15 20
No. 2 gray forge, neutral	14 20@14 70
No. 1 American Scotch	16 70@17 20
No. 2 American Scotch	15 70@16 20

Manufactured Iron.

The demand for bars is inconsiderable, car lots sold out of store going at $1.60@$1.65. Sheets hold up well on a basis of $2.75 for No. 24. The trade in channel iron, at $2.85, is weak, and gas pipe is away down, the discount on large black being quoted at 70. Nails, which are ostensibly held by the combination at $1.85 at the mill, are nevertheless sold at that price in town. Somebody is evidently slashing prices, as bar iron is offered in Chicago at $1.60, which would make the price here $1.47, and as gas pipe cannot be made for less than 67½ off the list, the firm that offers a discount of 70 must have a long bank account. Business is dull, and buyers scarce.

Scrap Iron.

Little movement is reported in any of the lines. Old American rails are sold at from $21.50 to $22; turnings are weaker.

Hardware.

A marked improvement has been noted in Spring goods, and orders are beginning to come in. Binder twine is scarce and high. Metals are holding their own, without any change.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

The iron market at this point has few incidents of any interest. There is no increase in the volume of business noticeable, and such business as is going is hotly contested. As a rule, consumers are letting their stocks run very low and buying from "hand to mouth," resulting in orders from small amounts and quick deliveries. Lake Superior charcoal iron is in light request, and some sales reported at slightly under recent ruling quotations. Leading sellers, however, are holding firm to $19.50, cash, at Chicago. We quote for cash, f. o. b. Chicago (Feb. 23):

Coke and Bituminous Coal Foundry:-Ohio (Hanging Rock softeners), No. 1, $18 00@18 50; Ohio (Hanging Rock softeners), No. 2, $17 00@17 50; Ohio (Hocking Valley softeners), No. 1, $18 00@18 50; Ohio (Hocking Valley softeners), No. 2, $17 00@17 50; Ohio (Hocking Valley silvery pure), No. 1, $17 00@00 00; Ohio (Hocking Valley silvery pure), No. 2, $16 00@00 00; Ohio (Black Band), $19 00@19 50; Ohio (Jackson county softeners), No. 1, $18 00@18 50; Norton and Ashland brands (Ashland, Ky.), No. 1, $17 00@17 50; No. 2, $16 00@16 50; Southern coke foundry No. 1, $16 50@17 00; Southern coke foundry No. 2, $15 75@16 25; Southern coke foundry No. 3, $15 25@15 75; Southern Coke, soft, No. 1, $15 75@16 25; Southern, coke, soft, No. 2, $14 50@15 00. Southern coke, Grey Forge, $14 50@15 00; Local furnaces at Chicago and Milwaukee, No. 1 foundry, $16 00@17 00; No. 2 foundry, $15 00@16 00; No. 3 foundry, 14 00@15 00; Charcoal Foundry:—Lake Superior, No. 1 and 2, $20 00@00 00: Hanging Rock, $21 00@23 50; Southern, $19 50@20 50; Car Wheel and Malleable:—Standard Southern, No. 3 to 6, $20 50@25 50; Lake Superior, $20 50@21 00: Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 00@24 00.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

While the situation remains practically the same as a week ago, there was one sale of 5,000 tons of Southern grey forge and No. 3 foundry made in this market during the week at the lowest price that has been made here for several years. The deliveries are to run through ten months, beginning April. The majority of Southern furnaces refuse to name any such prices, but a few are evidently compelled to realize on their output, and this buyer being a very desirable customer was able to obtain the iron at a very low price. Numerous inquiries for Lake Superior charcoal are being made, and some buyers claim that a few furnaces are willing to shade quotations, but the best brands are held firm and makers prefer to lose the orders rather than reduce prices. We quote for the present, as follows (Feb. 25):

Lake Superior Charcoal, all numbers, $19 50@$20 00; Lake Superior Coke, all ore, $18 75@$19 25; Lake Superior coke, cinder mixed, $17 75@$18 25; Standard Ohio Blackband, $18 75@$19 25; Southern No. 1, $17 00@$17 50; Southern Gray Forge, $15 00@$15 50; Southern Silvery, $16 50@$17 00; Jackson County (Ohio) Silvery, $18 25@$18 75; Old Wheels, $18 50@$19 00.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

If there has been any change at all in market conditions, it has been wholly in tone. We can record no change either way in prices. Southern forge irons are selling at 25c. higher than the lowest point touched. There is more inquiry and an increased volume in sales, although the market is still to be considered "quiet." Charcoal irons remain firm under light offerings. We quote on a cash basis, f. o. b. cars, Cincinnati (Feb. 23):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $15 25@$15 75; Ohio and Southern Coke, No. 2, $14 25@$15 00; Ohio and Southern Coke, No. 3, $13 75@$14 25; Ohio Soft Stonecoal No. 1, $15 50@$16 00; Ohio Soft Stonecoal No. 2, $14 50@$15 50; Mahoning and Shenango Valley, $16 50@$17 00. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 00@$22 50; Tennessee and Alabama Charcoal No. 1, $18 00@$18 50; Tennessee and Alabama Charcoal No. 2, $17 00@$18 00. FORGE—Strong Neutral Coke, $13 25@$13 50; Mottled Neutral Coke, $12 75@$13 25; Cold Short Coke, $13 00@$13 50. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00; Lake Superior Malleable & Car Wheel, $22 00@$23 00.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Meacham & Shields.

The market remains pretty much as last reported. Some orders have been placed, running through the year; but as a rule, buyers prefer to wait and buy only for their immediate wants. We quote (Feb. 23):

Hot Blast Coke & Charcoal-Southern Coke, No. 1, $15.25@$16.00; Southern Coke, No. 2, $14.75@$15.25; Southern Coke, No. 3, $14.25@$14.75; Grey Forge, $13.25@$13.75; Southern Charcoal, No. 1, $18.00@$18.50; Southern Charcoal, No. 2, $17.00@$18.00; Missouri Charcoal, No. 1, $16.00@$16.50; Missouri Charcoal, No. 2, $15.00@$16.00; Ohio Softeners, $18 00@20 00. Car Wheel and Malleable Irons.—Lake Superior, $20 00@22 00; Southern, $19 00@24 00. Connellsville Coke, East St. Louis, $4 70; St. Louis, $4 85.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

The market has been quiet with few sales. At this point more steadiness has been shown than in the past, and it is hoped that a slight advance can be obtained over the prices of last month. It is reported that considerable iron will be stored south, which, if true, will have a tendency to relieve the market, and cause increased value. We quote for cash, as folllows (Feb. 25):

Southern Coke, No. 1, foundry, (new classification) $14 75@$15 25; Southern Coke, No. 2, Foundry, (new classification) $14 25@$14 75; Southern Coke, No. 3, Foundry, (new classification) $13 75@$14 25; Grey Forge, $13 25@$13 75; White and Mottled different grades, $12 75@$13 25; Silver Grey, different grades, $13 00@$13 50; Southern Charcoal No. 1 Foundry, $16 25@$16 75; Southern Charcoal, No. 1, Mill, $14 75@$15 25; Southern Car Wheel, Standard brands, $21 75@$22 75; Southern Car Wheel, other brands, $18 00@$19 50. Hanging Rock Coke, No. 1, Foundry, $15 50@$16 00; Hanging Rock Charcoal, No. 1, Foundry, $19 50@$21 00; Hanging Rock, Cold Blast, $20 75@$23 75; Hanging Rock, Warm Blast, $00 00@$00 00.

PITTSBURGH PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by A. H. Childs.

The past week has developed more firmness in the iron market. A decided reaction from the condition previously existing. Holders began to make a stand not only against further concessions, but for a better price, and before the close of the week some sales were effected at an advance of fully 25 cents per ton over what was obtainable before. Many furnacemen claim that the decline carried prices below cost, and that a further advance may reasonably be expected. Quotations are (Feb. 25):

PIG IRON.—No. 1 Foundry, $16.50@$17.00; No. 2 Foundry, $15.50@$16.00; Gray Forge, $14.50@$15.00; White and Mottled, $14.00@$14.25; Warm Blast Charcoal, $18.00@$21.00; Cold Blast Charcoal, $22.00@$26.00; Bessemer, $16.50@$17.00.

SIR HENRY TYLER, M. P., of London, England, President of the Grand Trunk Road, has been discussing he work with the other officers of tunneling the St. Clair River from Port Huron to Sarnia. The tunnel will be a mile in length, and cost $2,500,000. The plant for boring and electric lighting is now on the ground, and the work will be completed within a year and a half. The Canadian Government is said to have given a bonus of $375,000 toward the project.

The Fourth of March at Washington.

The inauguration of General Harrison will be one of the memorable events of the Nation's history. Realizing that probably a greater number of people will desire to be present at the ceremonies than at any previous event of like nature, the managing officers of the Pennsylvania system of railways have planned and perfected arrangements for handling thousands of persons to and from Washington. Excursion tickets will be sold at cheap rates; trains will be run through without change from principal points; the yards and side tracks at Washington will be kept clear, and every precaution and every measure will be taken that will contribute to the prompt and satisfactory movement of every car. For full information apply to the nearest passenger or ticket agent of the Pennsylvania Lines.

Tickets to the Inaugural at Washington Via New York City.

Lowest excursion rates via the Nickel Plate. Tickets on sale February 26 to March 2. Good returning to March 8th, 1889. Consult agents of the Nickel Plate. Sleeping car berths reserved from Buffalo. Stop-over allowed in New York either direction. Excursion tickets also at lowest rates via any direct line.

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

BEARING DATE FEBRUARY 19, 1889.

Barbed nail, P. V. Husted, New York, N. Y.
Bolt-heading tool, F. Mutimer, Rockford, Ill.
Hinge, lock, T. C. Read, Fostoria, O.
Iron, machine for forming skelp, C. Benker, Pittsburgh, Pa.
Metal joint, universal, J. C. Haggett, Dunkirk, N. Y.
Metal plates or sheets, cleaning, R. B. Thomas, Lydbrook, England.
Metal table, E. H. Peck and A. H. Jones, Meriden, Conn.
Metallic joint, F. Funk, Decatur, Ill.
Mining machine, E. W. Whitcomb, Chicago, Ill.
Mining machine, E. E. Carter, Pittsburgh, Pa.
Mining purposes, tool for, G. A. Barth, St. Louis, Mo.
Ore-sampling apparatus, C. E. Palmer, Rico, Colo.
Roofing metallic, S. C. Frederick Arcadia, Kan.
Slack-burning furnace, T. Wilkinson and J. Glendinning, Kansas City, Mo.
Tires, machine for cooling wagon, W. X. Rupp and H. Resseger, Ella, W. Va.

EXPIRING PATENTS.

Relating to the Mechanic Arts, Which Become Public Property February 27, 1889.

Furnished by F. B. Brock, Patent Attorney, 639 F St., Washington, D. C.:

Water elevator, J. L. Burch.
Telegraph insulator, 2 patents, M. G. Farmer.
Pulley block, J. C. Cottingham.
Hoisting apparatus, S. K. Paden.
Manufacture of window glass, Carstens & Schwenke.
Cotton gin, R. McKenna.
Water relief valve for steam engine, J. Smith.
Engine and force pump, J. Houpt.
Propulsion of canal boats, H. W. Frackman.
Burglar alarm, H. Holcroft.

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Business Atlas

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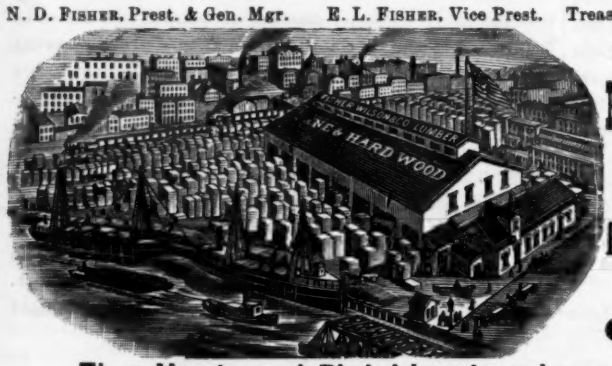

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Fruit and Jelly Presses.

Enterprise Mfg. Co.....dis 20&10@30

Fry Pans.

Central Stamping Co.'s low list.....dis 65&10

No	0	1	2	3	4	5	6	7	8
₱ doz.	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00

Fluting Scissors.

Discount.....45

Fluting Machines

Eagle 3¼-inch.....$2.15, dis 35
Geneva Hand Fluter. White Metal.. ₱ doz. 12.00.....dis 25
Shepard hand. Nos. 85 $15.30. 95 $8. 110 $11 dis 40
Knox, 4½ inch rolls.....$3 25 each } dis 35
Knox, 6 inch rolls.....$3 60 each }
Crown, 4½ in. $3 50; 6-in. $4 00; 8-in. $6 50 each.....dis 35
Crown Jewel.....6-in. $3 50 each, dis 35
American. 5-in. $3; 6-in. $3 40; 7-in. $4 50 each.....dis 35
Crown hand fluter, Nos. 1 $15; 2, $12 50; 3, $10 ₱ doz.....dis 30

Gauges.

Marking.....dis 60&10
Wire.....dis 10&10

Gimlets.

Nail and Spike.....dis 50&10&5
Double Cut, low list.....65
"Bee".....₱ gross $12. dis 25@25&5

Glue Pots.

Tin enameled.....dis 40@40&10
Family, Handy.....dis 50

Grindstone Fixtures.

Sargent's.....dis70&10

Gun Wads.

U. M. C. & W. R. A.—B. E., 11up...2 00 }
U. M. C. & W. R. A.—B. E., 9&10...2 30 }
U. M. C. & W. R. A.—B. E., 7&8.....2 60 } dis 20&2
U. M. C. & W. R. A.—P. E., 11up...3 10 }
U. M. C. & W. R. A.—P. E., 9&10...4 00 }
U. M. C. & W. R. A.—P. E., 7&8.....4 90 }
Eley's B. E., 11 up.....1 75
Eley's P. E., 11@20.....2 80

Hack Saws.

Griffin's Hack Saws, complete.....dis 40&10@50
Griffin's Hack Saw. Blades only.....dis 40&10@50
Diamond Hack Saws and Blades.....dis 25

Halters.

Jute horse and cattle ties.....60& 10&2

Hammers.

Maydole's.....discount 25@25&10
Atha new list, Jan 15, 1887.....dis 50@50&10
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30&10
Heavy hammers and sledges under 5 lbs. 3½c, over 5lbs, 30 c, new list.....60&10&10@70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs, $15 ₱ dos.....dis 10
Providence Tool Co., leg irons $25 ₱ dos.....dis 10
Tower's.....dis 25

Handles—

Door or Thumb Latches.

Per doz	Nos. 0	1	2	3	4	
Sargent's	90	1 00	1 18	1 35	1 50	dis 60&1 &10
Roggin's Latches						₱ doz. 30@35c
Bronze Iron Drop Latches						₱ doz. 70c net

Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88.....net
Barn door.....₱ doz $1 40, dis 0&10
Wrought chest.....dis 70
Surface chest.....dis 70
Flush chest.....dis 70
Lifting.....dis 70
Saw and plane.....dis40&10@40&10&5
Hammer and hatchet.....dis 40
Brad awl.....₱ gross $2
Hickory firmer chisel, assort.....₱ gross $4 50 }
Hickory firmer chisel, large.....₱ gross $5 00 }
Apple firmer chisel, assorted.....₱ gros $5 00 } dis 40
Apple firmer chisel, large.....₱ gross $6 00 }
Socket firmer chisel, assorted.....₱ gross $3 00 }
Socket framing chisel, assort.....₱ gross $5 00 }
File, assorted.....₱ gross $2 75 } 40@40 &10
Auger, assorted.....₱ gross $5 00 }
Auger, large.....₱ gross $7 00 }

Hangers.

Barn Door. old patterns.....dis 60&10 &10@70
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Richards.....dis 30@30&10

Harness Snaps

German, new list.....dis 40&10
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Hay Knives.

Lightning.....per doz. $18.00 dis 25
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Hinges.

Wrought Strap and T Hinges.....75@75&5
Screw, hook and strap, 6 to 12 in..... 3½
14 to 20in..... 3¼
22 to 36in..... 2¾
Screw hook & eye hinges...½ ₱ doz 1.50 }
⅝ 2.45 } ...dis 10
¾ 3.80 }
Gate, western.....₱ doz $4 40, dis 60
Gate, N. E.....₱ doz $7 00, dis 55
Gate, N. E. reversible.....₱ doz $5 20, dis 55&10
Gate, Clark's, Nos. 1. 2. 3.....dis60&10&5
Gate, N. Y. State.....₱ doz $5 00, dis 55&10
Gate, automatic.....₱ doz $12 50, dis 50
Gate, common sense.....₱ dos pair $4 50, dis 50
Gate, Shepard's.....dis 60&10&5

Hollow-Ware.

Stove Hollow-Ware. Ground dis.....60@60&5
" " Ungr'd.....60&10@60&10&10
Enameled Kettles.....dis 65&10
Saucepans.....dis 40&5
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

Hoes.

Garden. mortar.....dis 65
Planter's. cot.....dis 65
Canton.....dis 65

Hog Rings and Ringers.

Hill's rings.....$2 25@$2 40
" ringers.....{ Old Style.....$3 00 / Improved.....$4 50
Blair hog ringers.....₱ doz $2 60@$2.65

Hooks.

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Hooks and Eyes—Malleable Iron..dis 70@70&10
Hooks and Eyes—Brass.....dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable. ₱ lb	23	24	25	26	28	dis25&10to25&10&10
Putnam, ₱ lb	18	19	20	21	23	.....dis 15
Essex						25&10@25&10&10

Horse Shoes.

Burden, at factory.....₱ keg $4.00
R. I. Horse Shoe Co., Perkins' Imp. at factory.....₱ keg $4 00
Mule Shoes, at factory.....₱ keg $5.00

Hose, Rubber, Boston Belting Co's.

Standard.....70@70&10
Extra.....60@60&10
Best.....45&10

Ice Picks, Chisels, &c.

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Ice Cream Freezers.

American.....50&10
Gem.....55&10
Crown.....50&10

Ice Tongs.

Champion.....₱ doz $4.00, dis 25&10
Family.....₱ doz $2.75, dis 20@25

Jack Screws.

Illinois Bolt Co. list.....dis 70

Kettles.

	Spun.	Stamped.
Brass. 7 to 17 inches inclusive	24	21
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Keys.

Eagle, cabinet, trunk and padlock.....dis 33⅓&2

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Moran's Shoe Knives.....dis 20

Knobs.

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Base, Rubber Tip.....dis 70&10&5
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Door Por. Jap'd.....75c@78c
Door Por. Nickle.....2 00@2 25
Door Por. Plated.....2 00@2 25

Ladles.

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Melting, P. S. & W.....dis 35&10@40

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Tubular No. 0.....$4.50 per doz
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Tubular. Lift Wire. No. 0, ₱ doz.....6 00
Tubular. Lift Wire. No. 1. ₱ doz.....7 00
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We guarantee our A. & D. Flue Cleaners to give Steam the most perfect spiral motion entire length of tubes, and do the best work.

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—AND—

FINE

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—AND—

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Lithograph Building. Cleveland, O.

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Push plates, genuine bronze.....dis 60
Drawer pull genuine bronze.....dis 66⅔
Letter box plates, genuine bronze.....dis 60&10
Barn door locks .....dis 33⅓

Lemon Squeezers.

Porcelain lined.....₱ doz $6 00, dis 25&30
Wood.....₱ doz $3 00, dis 35
The "Boss".....₱ doz $2.50
Dean's No. 1, ₱ doz $6 50; 2, $3 35; 3, $1 90....dis
Little giant.....dis 50@50&5

Lines.

Cotton Chalk.....dis 55
Silver Lake, Braided, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross .....dis 25
Masons' Linen.....dis 45
Wire Clothes, No 18, $3.60; No 19, $3.00; No. 20 $2.50;.....

Mallets.

Hickory .....dis 20&10@20&10&10
Lignumvitæ.....dis 20&10@20&10&10
Penfield Block Co., Lignumvitæ and Hickory.....dis 30@30&10

Mattocks.

Regular list.....dis 60&5@60&10

Meat Cutters.

Dixon's (P.S.&W.)	1	2	3	4
	₱ doz. $14.00	$17.00	$19.00	$30.00
Draw Cut Nos.	5	2	6	8
Each	$50.00	$75.00	$80.00	$225.00

40&5
10
400.00
dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18 40&5

Hale's—Nos. 11 12 13
$27 $33 $45 dis 70@70&5

Enterprise.....dis 30

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Smith's, ₱ doz. single, $2 00; double, $3 00 dis 40@45

Money Drawers.

Tucker's ₱ doz.....$18 @20

Molasses Gates.

Stebbins' pat .....dis 70@70&7½
Stebbins' genuine.....dis 60&10&10
Stebbins' tinned ends.....dis 40&10
Lincoln's pattern.....dis 70@70&10
Scoville.....$7 45&10

Nails (wire).

List July 14 1887.....dis 70&10
Standard Penny Nails, ₱keg card rate
{ Car lots.....$2 50
{ Less than car lots, $2 60

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8	7	5½	4½	4	3½	3½
Hexagon.....	15½	11½	8½	6	5¾	5¼	5
Washers.....	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....₱ doz. $2 00, dis 10
Quakenbush.....$5 00 net

Oakum.

Government.....₱ lb 7¾@8c
U. S. Navy.....₱ lb6¾@7c
Navy .....₱ lb 5¾@6¼c

Oilers.

Zinc and Tin.....dis 65@65&10
Brass and Copper.....dis 50&10@50&10&5
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co .....dis 60
American Packing.....10@11c
Russia Packing.....14c
Italian Packing.....13@14c

Pencils.

Faber's Carpenters'.....high list, dis 50
Faber's Round Gilt.....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs .....$12 dis 60&5@60&10
" " 6 to 7 lbs .....$13 dis 60&5@60&10

Pinking Irons.

₱ doz .....65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
Brass head, combination list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

Sandusky Tool C .....dis 30

Pliers and Nippers.

Button's Patent .....dis 30&10@40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21 00 ₱ Doz.....dis 20&10@33⅓
Gas Pliers.....dis 60
Humason & Beckley .....dis 50@50&10
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10@70&10&10
Pocket levels.....dis 70&10@70&10&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ doz. $36.00, dis 25&10
Eureka Diggers .....₱ doz. $16.00 @ $17.00
Champion.....per doz $9.00
Vaughan's Hollow Tube Post Hole..$13.00@$14.00 dis40

Potato Parers.

White Mountain.....₱ doz $5.00@$5.50
Antrim Combination.....₱ doz $8.00
Hoosier .....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱doz $18.00.....dis 20&10
Disston's Pruning Hook.....₱ doz $12.00 dis 20&10
Pruning Shears .....₱ doz 3.75@$4.00 net

Pulleys.

Hot House .....discount 60&10
Japanned Screw.....discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 66⅔&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers....dis 60&10@60&10&10
Pitcher spout, cheaper goods....dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality, 60@65c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners.....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....₱ lb 35c dis 15
Sliding Door, Iron, Painted....₱ ft 4c dis20&10&5

Rakes.

Cast Steel.....dis 65
Malleable .....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10 @£...dis 10
Rifle Razor.....$9 50 net

Rivets.

Iron, Thousand, list November 17...dis 50@50&10
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 50@50&10

Rods.

Stair, Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ...dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla, ¼ inch and over.....15¼c
Sisal, ⅛ inch and over.....13¼c

Rules.

Boxwood..... discount 80&10@80&10&10&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs $2.40 @ $2.55
Self-heating.....₱ doz $9 net
Self-Heating, Tailor's.....₱ doz $18 net
Mrs. Potts's Irons, ...dis 40@40&5
Enterprise Star Irons.....discount 40

Sash Weights.

Per ton $22

Saws.

Disston's Circular..... discount 45@45&5
Disston's hand panel, rip &c.....dis 25@25&5
W. M. & C., Champion Regular..per foot 24@26c
W. M. & C., " Thin Back..₱ft 27@29c

Saw Frames.

White, Vermont.....₱ gross $9 00 @$10 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10@50

Scales.

Hatch, Counter, No. 171.....₱ doz $21.00
Hatch, Tea, No. 161.....₱ doz $6.75@7 00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10@50&10&4

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....₱ doz $4.00, dis 10
Foot.....dis 50&10@60

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1881.

Flat head iron	dis 70	Extra .....10 often given
Round head iron	dis 65	
Flat head brass	dis 65	
Round head brass	dis 60	
Flat head bronze	65	
Round head bronze	60	
Machine, flat head, iron	dis 55	
Machine, round head, iron	50	

Bench and hand—

Bench, iron	55&10@55&10&10
Bench, wood, beech, per dozen	$2.25
Bench, wood, hickory	20 & 10
Hand, wood	25&10@25&10&5
Lag or coach	dis 75@75&10
Coach, patent gimlet point	dis 75
Bed	25&5
Hand rail,	66⅔&10

Saw Tools.

Atkins' patent.....₱ doz sets $6 00

Shears.

American (Cast) Iron.....dis 75&10@75&10&5
Pruning .....See Pruning Hooks and Shears
Garnard's Lamp Trimmers.....₱ doz $3.75
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&10@60&10&10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00.....dis 25
Rogers, complete, $4.00.....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&20
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's.....dis 75
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&10&2

Ship Tools.

L, & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....60&10@60&10&10&5
Brass Head.....60&10&10

Sieves.

Metallic, new list.....dis 50&25&10
Flour sifters { Victor..... $2 00 / Hunter..... $2 25 / Comet..... $1 25

Slates.

School, by case.....dis 50&10

Spoke Shaves.

Iron.....dis 45
Wood .....dis 30

Spoke Trimmers.

Bonney's.....₱ doz $10.00 dis 50
Stearns'.....dis 20&10@30

Spoons.

Basting Spoons .....dis 70&10
Britannia.....dis 60
Rogers Bros. .....dis 50

Squares.

Steel and iron ..... } dis 75&10@80
Nickel plated..... }
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's.....dis30&5@30&10
"Lightining" screw plate .....dis 25&30

Stone.

Hindostan, No. 1, 3c; Axe, 3¾c; Slips 4¼c
Washita Stone .....No. 1, ₱ lb 14&15c
Turkey Oil Stone.....4 to 3 in.....₱ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1.....₱ lb 24@25
Washita No 2 stone.....₱ lb 11@12c
Arkansas Stone.....$1.50@$1.85

Stove Boards.

Zinc.....70
Oxidized.....45

Shovels and Spades.

Ames' list Nov 1 1885.....discount 20
Dennis.....5.25
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon's.....₱ gross $6 00 dis 10
Gem .....₱ gross 4 50 dis 10
Gold medal.....₱ gross 6 00 dis 25
Rising Sun.....₱ gross $5 50 net
Dixon's plumbago .....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering.....dis 15
Disston's Brick and Plastering... dis 25@25&10
Brade's brick.....dis 25

Tacks, Brads, &c.

New List, January 2, 1888.
American iron carpet tacks all kinds...80@80&5
Steel carpet tacks all kinds.....80@80&5
Swedes Iron carpet tacks all kinds .....80@80&5
Swedes iron tacks.....75&10@75&10
Swedes iron Upholsterers' tacks..75&10@75&10&5
Tinned Swedes iron tacks.....75&10@75&10&5
Tinned Swedes iron Upholsterers' tacks. ....75&10@75&10&5
American iron cut tacks .....75@75&10
Copper tacks .....50&10
Copper finishing and trunk nails.....50&10
Cigar box nails .....50&10@50&10&5
Finishing nails. .....70&10@70&10&10
Hungarian nails and miners' tacks.....70&10@70&10&10
Gimp and lace tacks.....75&10@75&10&5
" " " tinned.....75&10@75&10&5
Trunk and clout nails.....70&10@70&10&10
Tinned trunk and clout nails.....70&10@70&10&10
Basket nails .....70&10@70&10&10
Chair nails .....70&10@70&10&10
Common and patent brads.....70&10@70&10&10
Tinned capped trunk nails.....70&10@70&10&10

Tinware.

Stamped, Japaned & Pieced, list Jan 20, 1887.....dis 75@75&5

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35@40&5
Victor.....60&10
Wood, mouse.....₱ doz holes 11@12
Delusion, mouse.....₱ gross $18 00 dis 15

Trace or Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls.....	21c	&29c
No. 18, " " ¼ and ½ "	18c	&28c
No. 36, " " ¼ and ½ "	16c	&27c
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	11½	
3-Ply " 1 lb Balls.....	12	&12½c
3-Ply " 1½ lb Balls	11	&11¼
Cotton Wrapping, 5 Balls to lb.....	15@16c	

Vises.

Solid box.....60@60&5
Parker's.....discount 20@25
Prentiss....." 20 &5@25
Stephen's....." 25@30
Saw Filers, Wentworth's .....dis20&10
Saw filers, Stearn's .....33⅓&10@33⅓&10&10

Washer Cutters.

Smith's Patent .....₱ doz $12 00, dis 20&10&10
Johnson's.....₱ doz $11 00, dis 33⅓
Penny's.....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....₱ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.25. 10 in., $2.70; 12 in., $3.25

Wire. New List Jan. 18, 1884

Brass and Copper.....discount 20&25
Bright and annealed, Nos. 0 @18 .....dis70&10@75
" " Nos. 19 @ 26...dis 75@75&5
" " Nos. 27 @ 36...dis 75&10&5
Coppered Nos. 0 to 18, market list.....dis 70@70&5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18,..... dis 67½
Cast steel .....dis 50
Tinned Broom Wire.....dis70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis75
Annealed Grape, Nos. 10 to 14.....dis 75
Stubs Steel Wire regular.....$6 00.@lb dis30

Wrenches.

Coe's genuine, cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemis & Call's Combination.....dis 35
Donohue's Engeneers'.....20&10

TINNERS' STOCK.

Tin.

Banca ..... } Prices on application.
Straits..... }
English ..... }
Bar..... }

Spelter.

American, cash, ₱ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets.....$6 00@6 20
IX 14x20 112 sheets.....7 25@7 5
IC 10x14 225 sheets.....₱ box 5 75@6 0
IC 20x28 112 sheets.....12 00@12 5
IX 10x14 225 sheets .....7 25@7 5
IX 12x12 225 sheets .....7 50@7 7
For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only application.
No. 1, Refined.....
Bingham.....

Zinc.

in c, cask 6¼
in c, open 7½

LEAD.

Pig..... } Quotations on application
Bar ₱ lb..... }
Pipe ₱ lb..... }
Sheet. ₱ lb..... }
Chilled Shot ₱ bag 25 lbs..... }

BABBIT METAL.

No. 4.....6
Allens.....9¼
Excelsior.....15
W. B. Genuine.....25

COPPER.

Lake Ingot.....17@17¼
Arizona.....17¼

IRON AND STEEL

Flat Bar

1¼ to 4 by ⅜ to 1 inch.....1 70
4½ to 6 by ⅜ to 1 inch.....1 80
1¼ to 6 by 1½ to ⅜ inch.....2 10
1¼ &1⅜ by ⅝ to ⅞.....1 80
1 &1¼ by ⅝ to ⅜.....1 80
⅝, ¾ and ⅞ by ⅝ to ⅜.....2 20

Round and Square.

1 to 1⅛ inch.....1 70
2 to 2⅝.....1 90
2⅝ to 3¼ inches.....2 20
3⅜ to 4 .....2 70
4¼ to 4½ 3 20
4⅝ to 5 .....3 40

Oval.

⅜ to 1¼ inch.....2 10
⅝ to ¾ 2 30
⅞ 2 50
⅝ 2 90

Half Oval and Half Round.

1¼ to 3 inch.....2 80
⅜ to 1¼ 2 40
⅝ to ¾ 2 90
⅞ 3 20
⅝ 4 70

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch.....1 95
1 to 1⅝ by ¼ and 5-16 inch.....2 05
¾ to ⅞ by ¼ and 5-16 inch.....2 25
⅞ to ⅝ by ¼ and 5-16 inch.....2 75

Hoops.

1¼ to 4, Nos. 13 to 15.....2 55
1½ to 2, Nos. 16 to 18.....2 65
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....2 75
15-16, 1 and 1⅛, Nos. 18 to 18.....2 85
15-16, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 25
⅞, Nos. 13 to 15.....2 95
⅞, Nos. 16 to 18.....2 05
⅞, Nos. 19 and 20.....2 15
⅞, No. 21.....3 25
⅞, No. 22.....3 35
13-16, Nos. 13 to 15.....3 15
13-16, Nos. 16 to 18.....3 25
13-16, Nos. 19 and 20.....3 35
13-16, No. 21.....3 45
13-16, No. 22.....3 55
¾, Nos. 13 to 15.....3 25
¾, Nos. 16 to 18.....3 35
¾, Nos, 9 and 20.....3 45
¾, No. 21.....3 55
¾, No. 22.....3 65
11-16, Nos. 13 to 15.....3 45
11-16, Nos. 16 to 18.....3 55
11-16, Nos. 19 and 20.....3 65
11 16, No. 21.....3 75
11-16, No, 22.....3 85
⅝, Nos. 13 to 15.....3 85
⅝, Nos. 16 to 18.....3 75
⅝, Nos. 19 and 20.....3 95
⅝, No. 21.....4 05
⅝, No 22.....4 15
⅝, No. 23.....4 25

Light Band

1¼ to 6 by ¼ to 3-16 in.....2 25
1¼ to 6 by Nos. 11 and 12.....2 25
1 to 1⅝ by ¼ to 3-16 in.....2 35
1 to 1⅝ by Nos. 11 and 12.....2 45
⅞ and 13-16 by ¼ to 3-16 in.....2 65
⅞ and 13-16 by Nos. 11 and 12.....2 75
¾ and 11-16 by ¼ to 3-16 in.....2 95
¾ and 11-16 by Nos. 11 and 12.....3 05
⅝ and 9-16 by ¼ to 3-16 in.....3 25
⅝ and 9-16 by Nos. 11 and 12.....3 30
½ by ¼ to 3-16 in.....3 50
½ by Nos. 11 a d 12.....3 60

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 15.....2 75
⅝ inch, " " " 13 and 14.....3 05
¾ inch, " " " 11 and 12.....3 05
¼ inch " " 13 and 14.....3 25

Sheet Iron.

No. 13 to 4.....2 45
No. 15 to 17.....2 65
No. 18 to 21.....2 75
No. 22 to 24.....2 85
No. 25 to 26.....2 95
No. 27.....3 05
No. 28.....3 25

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 35
C No. 1, " 2 60
C H No. 1, " 2 85
C H Flange, " 3 55
Extra Flange, " 3 95
Solid Fire Box, " 4 85

Steel Boiler Plates—1-4 in. and heavier.

Tank $2 55
Shell $2 95
Flange.....$3 20
Marine Flange.....$3 70
Fire Box.....$4 35
Above includes plates 90 inches wide.
90 to 96 in. wide..... ½c. ₱ lb extra.
96 to 100 in. wide.....1 c. "
100 to 104 in. wide.....1½c. "
104 to 116 in. wide.....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ₱ lb
to 2 in. inclusive	.09
9-16 to ½ in. "	.09
7-16 to ⅝ and 2⅛ to 3 in.	10½
3⅛ to 4 in.	11
⅝ to 11-16 an 4½	.10½

TRAVELER'S REGISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.— "The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	7 30 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger		6 30 a m
Fostoria Passenger	5 06 p m	5 11 p m
Local Freight	1 00 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.
Euclid Accommodation departs 6:24 a. m. 5:05 .m.
All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 50 p m	7 45 a m
New York Express	6 35 p m	1 35 p m
Alliance & Akron Accom	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 p m
Akron, Col. & Zanesv'e Ex	12 50 p m	1 35 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.

Depot. South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Mnoday.

Cleveland and Canton Railroad.

Depart—
Canton and Coshocton—7:00 a.m , 3:15 p. m.
Bedford—7:00 a.m., 11:10 a. m., 2:00 p.m., 3:15 p.m., 4.40 p.m., *5:45 p.m., 10:35 p.m.
Newburgh—6:12 a.m., 7:00 a.m., 11:10 a m., 2:00 p.m., 3:15 p m., 4:40 p.m., *5:45 p.m., 7:30 p.m., 10:35 p.m.
Kent—7:30 a.m., 3:15 p.m., *5:45 p.m.
Arrive from—
Canton and Coshocton—7:50 a.m., 6:55 p.m.
Bedford—6:00 a.m., *8:12 a.m., 9:50 a.m., 1:05 p.m., 4:05 p.m., 6:40 p m., 7:10 p.m.
Newburgh—6:00 a.m., *8:12 a.m., 9:50 a.m., 1:05 p.m., 4:05 p.m., 6:40 p.m., 7:10 p.m., 9:10 p.m.
Kent—*8:12 a.m , 9:50 a. m., 6:55 p m.
Theatre train leaves Cleveland 10:35 p.m. and runs through to Newburgh and Bedford daily, except Sunday
Trains marked with * run daily. All others daily except Sunday.
Depot at Ontario street, opposite Huron stree

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail	*7 45 a m	*6 30 p m
Marietta Express	†11 15 a m	†2 30 p m
Valley Junction Express	* 4 15 p m	*10 15 a m
Cleve. & Canton Ex	° 7 00 p m	†8 15 a m

■*Daily. †Daily. except Sunday.
WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Ag't.

Cleveland, Lorain and Wheeling.

All trains arrive and leave the Union Depot as follows:

	DEPART.	ARRIVE.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

OSCAR TOWNSEND, Gen. Mang'r.

Cleveland & Marietta R. R.

In effect December 2, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 50 AM	2 00 AM	..Parkersburg...	2 45 PM	11 45 PM
11 50	6 45	.....Marietta.....	10 00 AM	7 03
12 53	7 50	.....Elba.....	8 56	5 59
1 00	7 57	....Macksburg...	8 49	5 52
1 07	8 04	...Dexter City...	8 42	5 45
1 11	8 09	...South Olive...	8 38	5 40
1 25	8 25	.....Caldwell.....	8 25	5 26
1 35	8 35	..Belle Valley...	8 10	5 16?
1 56	8 56	.Pt. Pleasant...	7 47	4 54
2 0	9 08	.....Byesville.....	7 33	4 40
2 28	9 27	...Cambridge...	7 14	4 24
2 57	9 50	...Kimbolton....	6 47	3 57
3 15	10 13	N. Comerstown	6 25	3 35
3 57	10 55	...Canal Dover..	5 45 AM	2 53
4 17	11 17	ar. Vall'yJ'n.lv		2 30
		lv. Vall'yJ'n.ar		
	12 15 PM	.....Canton.....		1 28
	1 15	.....Akron.....		12 30
	2 46	... Cleveland....		11 15 AM
	8 15	.....Buffalo.....		5 40
11 15 PM	6 20	.....Toledo.....		7 45

Train No. 8 leaves Marietta at 3 00 p. m. Whipple 4 00, Warner 4 15, Elba 4 35, Macksburg 4 45, Dexter City 4 55, Caldwell 5 26, arriving Cambridge 7 00 p. m. Train No. 5 leaves Valley Junction at 4 50 p. m., arriving at Canal Dover 5 12 p. m.
Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland, and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio ver Packets; at Cambridge with the B. & O. east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W. and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

W. K. RICHARDS, Gen. Pass. Agt.
A. T. WICKOFF, Gen. Manager.

THE FAVORITE
AND
Picturesque Route
TO
New York, Boston and the East.

The Shortest and Quickest Route to Pittsburgh Washington and Baltimore and the Southeast.

New Central Depot So. Water St. and Viaduct

	Depart.
No. 62, Accommodation	† 6 00 a m
No. 72, New York Express	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast Pittsburgh Express	* 3 00 p m
No. 66, Leavittsburgh Accommo	* 4 20 p m
No. 68, Pittsburgh Express	†10 50 p m
No. 68, New York Express	†10 50 p m
No. 70, Pittsburgh Local Express	†11 45 a m
No. 74, Youngstown Express	† 4 20 p m
	Arrive.
No. 65, Fast New York Express	*12 50 a m
No. 61, Pittsburgh Express	* 7 35 a m
No. 67, Pittsburgh Express	†10 55 a m
No. 63, New York Express	* 6 50 p m
No. 63, Pittsburgh Express	*6 50 p m
No. 69, Pittsburgh Local Express	† 9 10 p m
No. 13, Accommodation	† 5 25 p m

* Daily. † Daily, except Sunday.
☞This is the only route by which passengers can reach Corry, Elmira, Binghampton. New York City and intermediate points without change. No change to Boston and New England cities.
Baggage checked through to all points East.
Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Depot N. Y., P. & O. Railroad, South Water Street and Viaduct, Cleveland.

A. M. TUCKER, Gen. Sup't., Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cleveland, O.
M. L. FOUTS, City Pass. & Ticket Ag't, 141 Superior Street, Weddell House, Cleveland, O.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5: P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

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Gen'l Pass. Agent, South Bethlehem, Pa.

Pittsburgh & Lake Erie Railroad.

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WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT NOV. 25, 1888
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 07	5 45	10 00
Fremont	9 06	2 33	6 10	.....
Clyde	9 22	2 49	6 25	.....
Bellevue	9 37	3 04	6 40	.....
Monroeville..lv	9 55	3 20	6 58	2 05 AM
Norwalk	10 10	3 40	7 17	2 17
Wellington	11 00	4 30	8 12	2 55
Creston	11 53	5 17	9 20	3 42
Orrville.....ar	12 20 PM	5 45	9 50PM	4 10
Orrville.....lv	12 40	6 05	6 35 AM	6 35
Massillon.....ar	1 20	6 45	7 18	7 18
Massillon.....lv	1 20	6 45	7 18	7 18
Navarre	1 35	7 00	7 35	7 10
Valley Junc.lv.	2 20	7 35	8 20	8 20
New Cumberl'd	2 23	7 48	8 40	8 40
Sherrodsville	2 45	8 00	9 00	9 00
Leesville	2 52	8 08	9 20	9 20
Bowerston....ar	2 58PM	8 15PM	9 30AM	9 30AM
Canal Dover	3 53 PM	.....	.....	.....
New Comerst'n	3 35	.....	.....	.....
Cambridge	4 24	.....	.....	.....
Macksburg	5 52	.....	.....	.....
Marietta.....ar	7 03 PM	.....	.....	.....

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta.....lv	6 45 AM	11 50 AM	.....	.....
Macksburg	7 57	1 00 PM	.....	.....
Cambridge	9 27	2 28	.....	.....
New Comerst'n	10 13	3 15	.....	.....
Canal Dover	10 55 AM	3 57PM	.....	.....
Bowerston	10 45 AM	3 50PM	5 55 AM	.....
Leesville	10 52	3 57	6 02	.....
Sherrodsville	11 00	4 05	6 10	.....
New Cumberl'd	11 12	4 17	6 22	.....
Valley Junc	12 10 PM	4 35	6 45	.....
Navarre	12 45	5 10	7 35	.....
Massillon	1 05	5 25	8 00	.....
Orrville.....ar	1 40	6 05	8 58	.....
Orrville.....lv	1 45	6 35*	9 13	.....
Creston.....lv	2 18	7 04	9 42	.....
Wellington	3 05	7 43	10 33	.....
Norwalk	3 55	8 30	11 30	7 25 AM
Monroeville	4 07	8 40	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20	.....	12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40AM	Ar.. Huron ..Lv	8 55 AM	5 20PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	.....Milan	9 28	6 03
Lv 3 55	Lv 6 45		Ar 9 55	Ar 6 30
Ar 3 30	Ar AM	.....Norwalk.....	Lv 11 30	Lv 8 30
3 20 PM	.....	.....Monroeville..	11 45 AM	8 40 AM

* Daily.
Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m
This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.
Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Havernill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday,
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland.....Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Havernill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 03 "	2 39 "	10 31 "
Columbus.....Ar	8 30 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.

JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohi

Ft. Wayne, Cincinnati & Louisville

RAILROAD.
THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH
THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER 13
—BETWEEN—
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER AND QUICKER 22
By 3 HOURS, Between
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Presenting best methods and original rules for obtaining good, sound, clean castings, and giving detailed description for making moulds requiring skill and experience.

Also containing a practical treatise upon the construction of cranes and cupolas, and the melting of iron and scrap steel in iron foundries. By

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Practical iron moulder and foundry foreman member of the American Society of Mechanical Engineers and of the Civil Engineers' Club of Cleveland, Ohio.

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Fully illustrated and with complete index Will be mailed, prepaid, on receipt of the price.

On receipt of $3.00 we will send the above book and the IRON TRADE REVIEW for one year

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CLEVELAND, OHIO.

½ to 6 in.	11½
¼ to 9-32 and 6½ to 7 in	12
3-6 in	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery, base price	02½
Tire, "	02¾
Spring, "	03¼
Sleigh Shoe, "	02¾
Toe Calk	03
Cutter Shoes, tapered and burr	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3½ to 4 "	0.3
4½ to 6 "	1.0
¾ to 15 16 "	0.2
¼ to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7
Machine cutting, specified lengths, ab'e 24 in.	0.2
Machine cutting, specified lengths, 12 to 24 in.	0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS.

	cts. per lb ex.
1½ to 6 in., by 5-16 to 1 in. thick	base
1½ to 6 in., by ¼ and 9-32 in. thick	0.2
1½ to 6 in., by 3-16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in, thick	0.4
¾ to 1 7-19 in., by ¼ to 1 in. thick	0.3
⅝ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
¾ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
⅝ to 11-16 in., by ¼ to ½ in. thick	0.4
¾ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅝ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅝ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1¼ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS.

	cts. ex.
1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1⅛ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅝ to 3 in. by No. 8 gauge to 10 gauge "	1.0
¾ to 3 in. by No. 11 gauge to 16 gauge "	2.0
¾ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅝ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅝ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅝ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 inch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL.

	cts. ex
⅝ to 1½ inches	base
¼ to 9-16 inches	0.2
⅝ to 7-16 inches	0.5
5 16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets

⅛, ¾, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ¾, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2½c
Pipe mill castings	3 c
Rolling mill castings under 50 lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3½c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3½c
Engine castings, heavy	2½c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails, gross tons	$27 00
Old steel rails	23 00
Car wheels	20 00
Old copper, per lb	7
No. 1. H. red Brass	8½
Heavy yellow brass	6¾
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black, X str	52½
" XX str	52½
Wrought iron pipe: Lap black, X str	52½
" XX str	52½
Wrought iron pipe: Butt galv	45
" " Lap "	52½
Lap-welded boiler tubes	55
" drive pipe	
" casing	
Lead pipe, per lb	5¾
Sheet lead, "	5¾
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	67½
" flange unions	75
Long screws	70
Gas pipe hooks	50
Cast iron flanges	70
Manifolds and expansion pipe hangers	67½
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves, expansion joints	70
Iron cocks	65
Straight way valves	50
Brass: Globe, angle, check, cross safety, and radiator valves	65
Throttle and butterfly valves	55
Brass: Fin. globe valves, with finished brass wheels	45
Brass: Steam, service, meter and union meter cocks	60
Brass: Expansion joints and steam bibbs	55
Mississippi gauge cocks	55
Bingham "	
Gas proving pumps	60
Oil cups, lubricators and air cocks	65
Cocks for steam gauges	65
Cylinder cocks	55
Comp. gauge cocks	60
Water gauges, steam whistles and whistle valves	65
Gas fixture fittings	50 &10
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65&5
Galvanized wrought iron range boilers, larger	60&10
Stands for same	40
Copper bath tubs	30
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	75
" slop sinks	70
Drive-well points	50
Ground key work:	
Plain, tray and bath bibbs, stops, shower stops, hydrant and ball cocks—rough	60
Finished, do	55
Compression:	
Rough and fin. plain, tray and bath bibbs	60
" " stops; urinal, hopper, hydrant and ball cocks	60
Basin cocks, from No. 1 to 13 inclusive	60
" " double basin	45
Shampooing and sink cocks	45
Pantry cocks	55
Shampooing sprinklers	60
Double bath cocks and chain stays	60
Hose goods, plain and water back couplings	60
Boiler couplings, ground face, per set	$1.00 net
Boiler couplings plain face, per set	90c net
Basin plugs and grates; bath, sink and wash tray plugs	60
Soldering nipples	70
Soldering unions	65
Union joints	65
End ferrules	70
Street washer screws, checks and guides	60
Hydrant and basin clamps, hydrant sockets	60
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Plain	50
" Jarecki	50
" Robbins' chain	30
" Brock's	30
Vises: Plain pipe	50
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	35
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
14	9 00		.375	58 00	8	
15	10 00		.375	62 10	8	

Extra Strong, double above list.
Double and strong 4 times above list.

Double Extra Strong, double list of Extra Strong.

LAP-WELDED BOILER TUBES.

Size, Outside Diameter, inches	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	5	6	7	8	9	10	11	12
Price per foot	23	23	23	22	22	22	28	31	34	38	43	45	52	56	61	66	72	79	86	1 00	1 30	1 45	1 85	2 10	2 25	2 75
Price, Lap-Welded Drive Pipe	8	10	12	.....	15	25	31	22	30	.....	40	.....	60	.....	72	.....	90	1 20	1 65	2 00	2 50	3 00	4 00	4 50	5 50	6 75

DRIVE PIPE SHOES.

	6"	8"	10"	12"
Long, Separate	13 00	15 00	20 00	25 00
" Shrunk on pipe	16 00	18 00	25 00	30 00
Short, Separate	12 00	14 00	17 00	22 00
" Screwed on pipe	13 00	15 00	19 00	24 00

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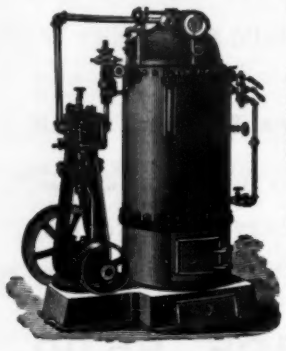

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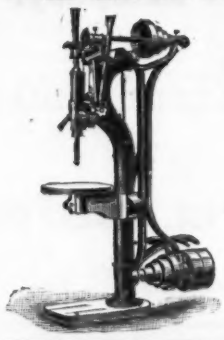

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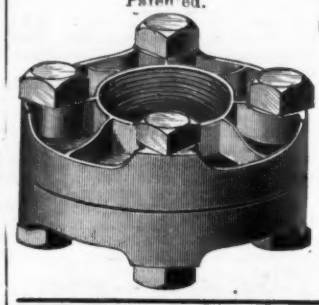

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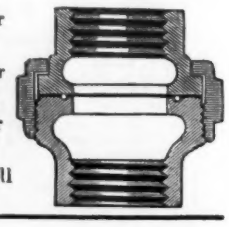

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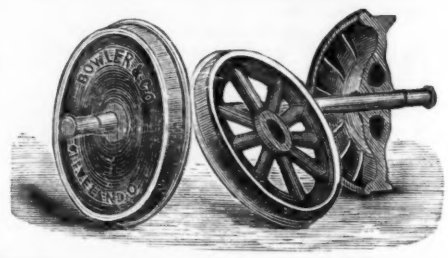

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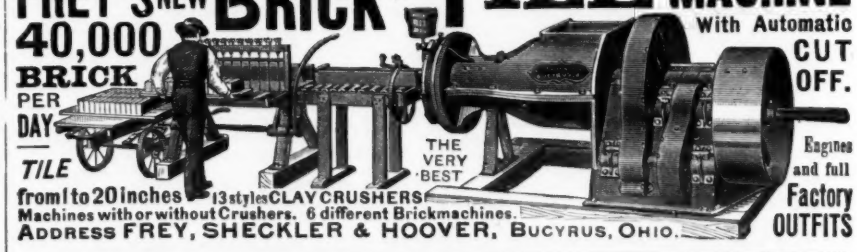

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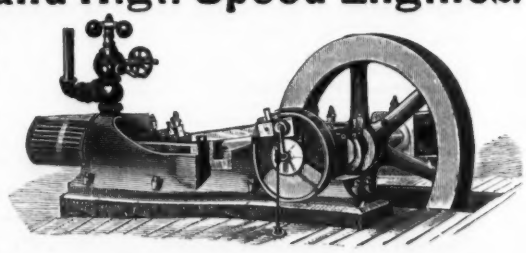

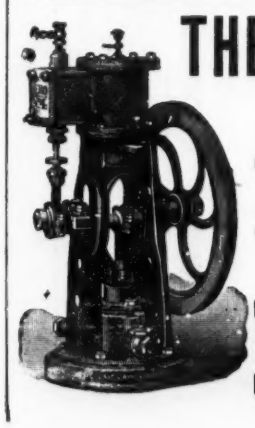

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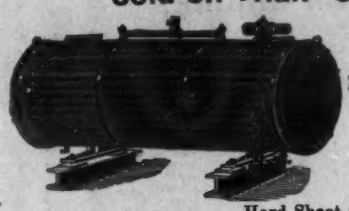

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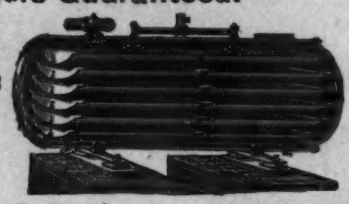

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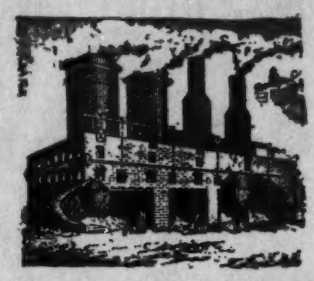

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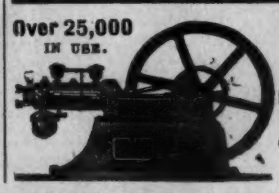

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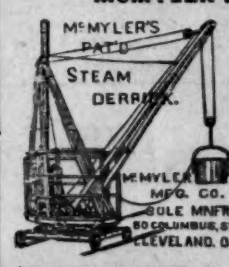

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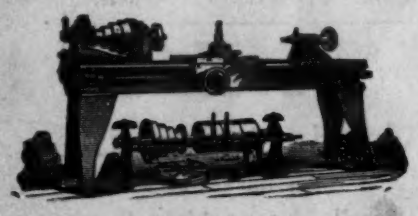

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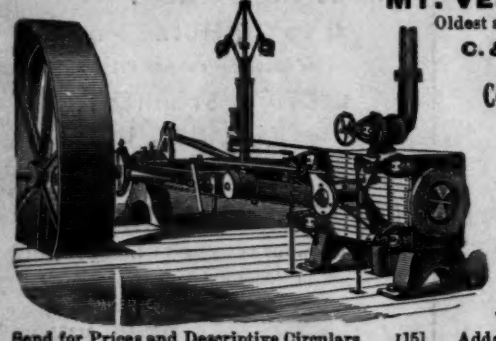

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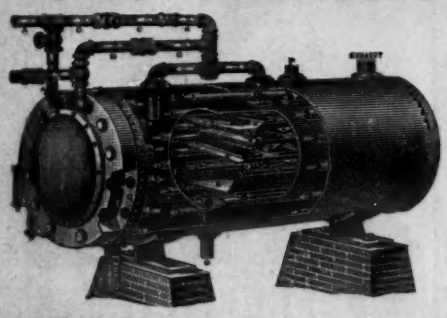

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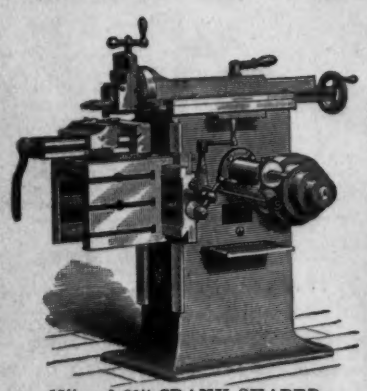

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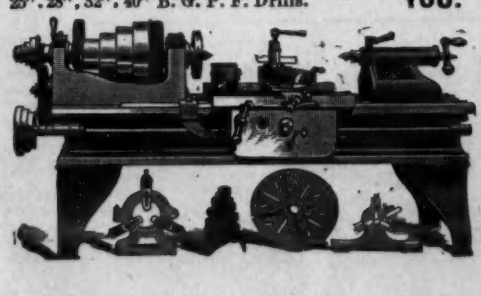

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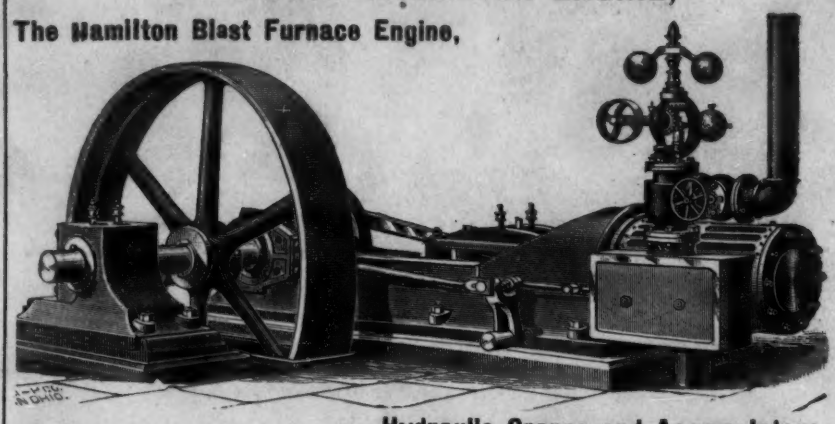

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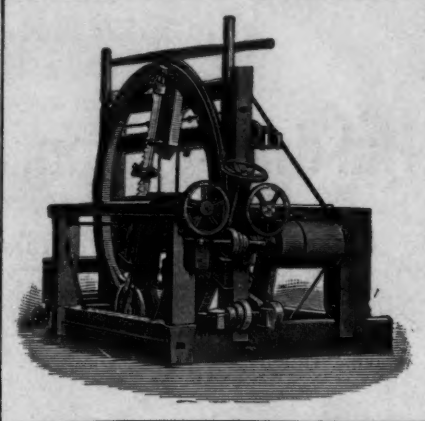

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